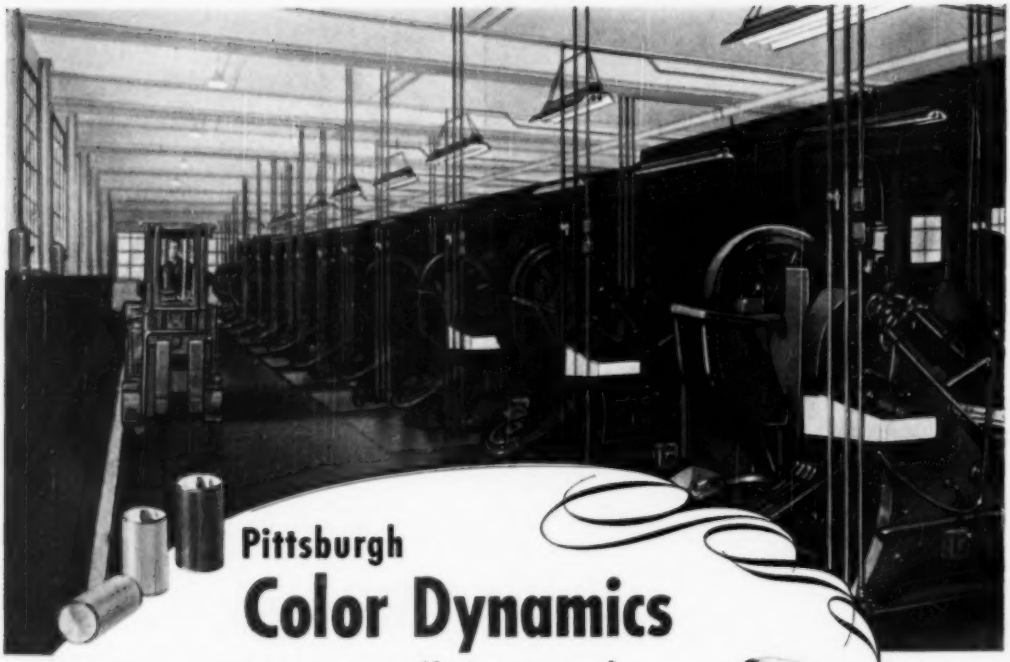
OCTOBER, 1949 Vol. 38, No. 8

Industrial Arts and Vocational Education

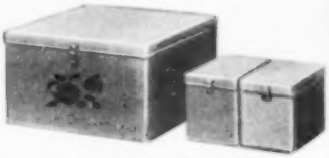
The Shop Teachers' Professional Magazine

SHOP PROJECTS NUMBER



Pittsburgh Color Dynamics

increases efficiency and improves morale of employees in Continental Can Company plant



Open top press room of Continental Can Company's Baltimore plant after being repainted according to COLOR DYNAMICS specifications.

Teach your students how the scientific use of energy in colors makes production safer and better

BESIDES a knowledge of metals, machines and methods, the skilled shopman of tomorrow must know how to use color to turn out more and better production.

By using Pittsburgh's system of COLOR DYNAMICS he will be able to focus an operator's attention more closely on his task.

Use of proper *focal* colors will separate working parts from stationary parts of the machine and from the material being worked on. This reduces eye travel, which is one of the chief causes of eye fatigue. The result of this improved visibility makes itself felt in the daily output of the worker—and in his attitude toward his work.

COLOR DYNAMICS also shows the student how to use *morale-building* colors to promote cheerfulness and restrain mental depression. It also shows him how to use safety colors to reduce danger of accidents.

COLOR DYNAMICS has been applied with great success in many plants throughout the country. It is generally recognized as a distinct advance in production technique.

Begin now to teach the importance of this new kind of painting system to your students. Write for a FREE copy of our book which explains how to use this method. Packed with many practical suggestions it is an excellent textbook for students in manual training and vocational education.

SEND FOR THIS FREE BOOKLET!

Pittsburgh Plate Glass Co., Paint Div., Department IV 3-9, Pittsburgh 22, Pa.

☐ Please send me a **FREE** copy of your new revised and enlarged Booklet "Color Dynamics In Industry."

☐ Please have your representative call for a Color Dynamics Survey of our property without obligation on our part.

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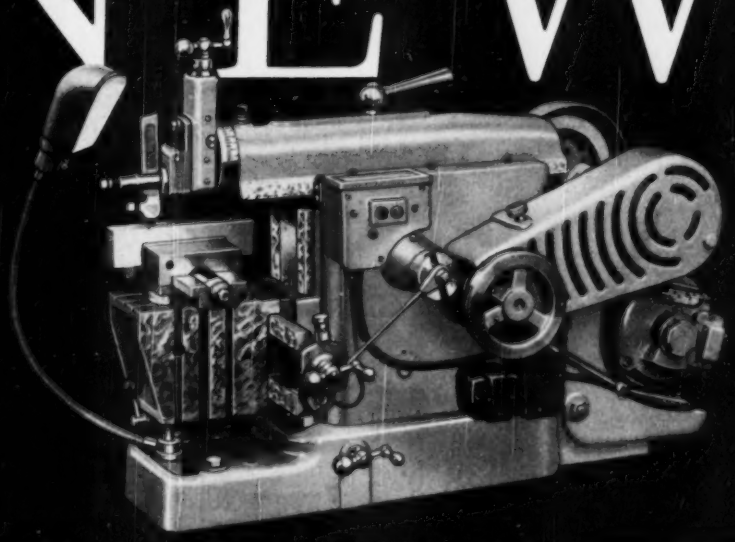
PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

NEW!



7" PRECISION SHAPER by SOUTH BEND

Fast... Accurate

The South Bend 7" Bench Shaper has been designed as a highly accurate, fast and rugged tool. It is especially suited for toolroom, production and maintenance work that requires close-tolerance machining of a wide variety of small jobs. Built to the same high standards of workmanship and performance as South Bend Precision Lathes, it can be depended on for economical metalworking. *Write for literature.*

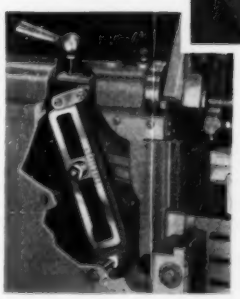
SOUTH BEND LATHE WORKS
Building Better Tools Since 1906 • 466 E. Madison St., South Bend 22, Indiana

RAM—Stroke length—0 to 7". Strokes per minute (4)—42 to 195. Cutting speeds—3 to 114 feet per minute.

TOOL HEAD—Vertical feed—3". Rotation—180°. Tool holder size ⅜" x ⅞".

TABLE—Horizontal travel—9¼". Vertical travel—5". Power cross-feeds (6)—.002" to .012". Ram clearance—⅛" to 5¼". Table size—5-7/16" x 5" x 6".

VISE—Jaw width—4". Jaw depth—1". Maximum opening—4". Swivel base.



Rocker and crank assembly with graduated eccentric adjustment for ram stroke.

Steel stand for shaper—3 drawers and built-in chip pan.

PRICES
(f. o. b. factory)

7" Precision Bench Shaper $425

(Price of shaper includes light fixture, vise, drive unit, motor pulley, V-belt, and switches. Stand for shaper and motor are extra.)

Steel Stand $125

Motor—1/3 h.p., 115 V., 1 ph., 60 cy., A. C. **$31.30**

Manufacturers of
Precision Lathes, Drill Presses, and Shapers.

WESTON
High-Frequency Analyzer

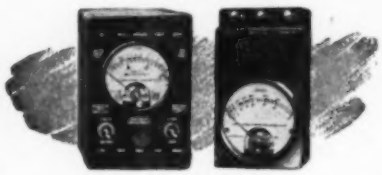
MODEL 769

Provides:

1. A stable, probe type, Vacuum Tube Voltmeter.
2. A high impedance electronic Volt-Ohmmeter using 115 volt, 60 cycle power.
3. A conventional Volt-Ohm-Milliammeter with self-contained power source.

Ideal for practically all electronic measurements up to 300 megacycles. Especially designed for AM, FM, and Television requirements. Completely independent of line voltage variations between 105 and 130 volts. Full details in bulletin R-31-B.

COMPACT TEST EQUIPMENT FOR CLASSROOM USE



Volt-Ohm-Milliammeter (Model 697)—Contains carefully selected group of ranges to cover a wide variety of electrical measurements. Compact, light weight, and low in cost.

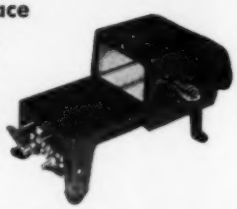
Ohmmeters (Model 689)—Available in two, double range instruments . . . 0-10 and 0-1000 ohms full scale; and 0-5000 and 50,000 ohms full scale. Compact, rugged and low in cost.

WESTON *Instruments*

Write for Bulletin No. E5A describing the full line of WESTON Test Equipment . . . Weston Electrical Instrument Corp., 595 Frelinghuysen Avenue, Newark 5, N. J.

TEACH HEAT TREATING WITH *JOHNSON* FURNACES

No. 101 Bench Furnace



● Delivers up to 1800° F. without a blower. The most efficient, powerful and economical bench furnace made for heating soldering coppers up to 12 pounds per pair. Also used for heat treating, case hardening and annealing carbon steels. Two burners. Firebox 3¾ x 4½ x 5½. Complete with work rest block and baffle plate.

$17.50 F.O.B. Factory

No. 118 Combination Bench Furnace

● Use this furnace for heating largest soldering coppers, stenciling irons, branding irons, etc.—for heat treating, tempering and case hardening carbon steels. And for melting soft metals such as lead, tin, babbitt, zinc, etc. A powerful two burner furnace. Lid on hood may be removed and 22 pound melting pot inserted. Firebox 6¼ x 5 x 6½.

$33.00 F.O.B. Factory

FREE CATALOG

Renew the efficiency of your present Johnson Furnace. Write for complete details on Factory Reconditioning.

Johnson Gas Appliance Co.

585 E Avenue N.W. Cedar Rapids, Iowa

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A different name for your old friends:
PROTO TOOLS
—formerly
PLOMB TOOLS
Big news in the tool industry! The leading hand service tools are now named PROTO tools—formerly Plomb tools. Their top quality has made them professionals' favorites since 1907. Remember PROTO tools – formerly Plomb tools – when you buy from your dealer.
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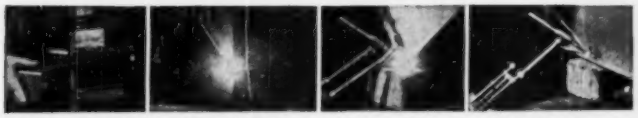
2204M Santa Fe Avenue,
Los Angeles 54, Calif.
PROTO TOOLS
LOS ANGELES

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, October, 1949, Volume 38, No. 8. Published monthly, except July and August, by The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. Entered as Second-Class Matter January 2, 1914, at the Post Office at Milwaukee 1, Wis., under the act of March 3, 1879. Subscription price in the U. S., Canada, and countries of the Pan-American Union, $3.00 per year; Foreign, $3.50; Single copies, 35 cents.



It Spot Welds! It Arc Welds! It Brazes! It Solders!

new!

5KVA SPOT WELDER and 120-AMPERE ARC WELDER in *One* COMBINATION UNIT

— both for considerably less than the usual cost of separate units!

DELTA "Dual Weld" Combination Welder

DELTA MILWAUKEE®

Now you need only a *single machine* to teach spot welding, arc welding, brazing, and soldering! Students can spot weld fine wire just as efficiently as 16-gauge steel and quickly change over to arc welding, soldering or brazing . . . all on this one machine.

The price for this dual-purpose Delta Combination Welder is considerably under that of an individual 5KVA spot welder and 120-ampere arc welder! That's due to Delta's unique design, careful engineering, and high production methods.

In industrial plants and in schools everywhere, low-cost Delta-Milwaukee Machine Tools have long been recognized as the finest machines available. Now you can give students (and yourself) the advantages of the same high Delta quality in welders.

Have your nearby Delta distributor show you this new Delta Combination Welder. Get a better idea of the many ways that you can use it in the classroom. Also see the new *Delta 5 KVA Spot Welder* and *Delta Portable Arc Welder*. And ask about deferred payments that suit your budget.

Send coupon for descriptive bulletin AD-453.

DELTA MANUFACTURING DIVISION
ROCKWELL MANUFACTURING COMPANY
MILWAUKEE 1, WISCONSIN

Look for the name of your Delta distributor under "Tools" in the classified section of your telephone directory.

For delivery in time for the Fall semester, specify Delta Welders on your requisition now!

No Other Welder Like It!

Look at these features:

- **One-Piece Welding Horns** — Eliminates inefficient electrical joints, reduces maintenance costs, provides maximum current for spot welding.
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- **Wound Transformer Core** — Has extremely low watt-loss.
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- **Infinite adjustment** of current throughout the full range of both spot and arc units.

Tear out coupon and mail today!

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Send me free bulletin AD-453 describing the new Delta welders.

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9-49

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better workmanship . . . use modern
Snap-on Tools

Among the basic factors that determine the ability of a student to appreciate the importance of the job he is doing . . . is the quality of the tools you provide. Give him an unfinished, unbalanced, loose-fitting set of tools and you take away his appreciation of the job to be done.

Give him Snap-on tools, the choice of better mechanics, and he's ready with the right tool, the right size, strength, balance, feel, and fit to turn out a job that will be a credit to your teaching ability.

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Individually Tested...
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Openings 1 in. to 14 in.

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No. 640 IMPROVED "I" Bar Clamp
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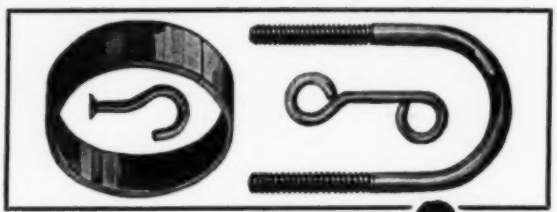
THERE IS AN INDUSTRIAL DISTRIBUTOR STOCK NEAR YOU

Ⓗ HARGRAVE
Tested Tools
THE CINCINNATI TOOL COMPANY



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Bender No. 2
forming steel tubing

Thousands of DI-ACRO Benders are in regular production use forming a great variety of small parts of manufactured products. Your students can learn to duplicate parts accurate to .001" in tubing, angle, channel, flat, round, or square materials with these precision machines.

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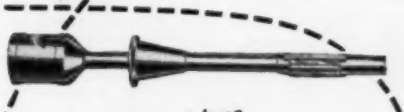
351 Eighth Ave. • Lake City, Minnesota

Good News for School Shop Budgets

AMMCO model 2600 and 1600 Combination for Wet Honing

Costs less to BUY...and Costs less to MAINTAIN

$298.50



ONE *Permanent type* HONING HEAD handles 90% of all jobs within range!

Here's a really versatile combination set-up to meet all needs for shop training in both *wet* and *dry* honing. Best of all, it's the only honing machine that can handle all sizes within its range with *only one honing head* . . . And you'll find your stone replacement cost at least 50% less. Model 1600 Coolant Unit is portable and can be used with other machines in your shop. Mail the coupon below to get full information on the economical AMMCO honing combination. We'll also send you the name of your nearest AMMCO distributor who will be glad to arrange a demonstration in your shop at no charge or obligation.

Perfect for School Shops... the AMMCO 7" SHAPER

A "precision machine of a thousand uses" . . . regular industrial model, featuring simplicity of operation, ease of set-up, precision results. Check coupon for complete details.

AMMCO

AMMCO TOOLS, INC., 2100 Commonwealth Avenue, North Chicago, Ill.

- ☐ Send information on Combination 2600-1600
- ☐ Send information on AMMCO 7" Shaper
- ☐ Send free copy of the AMMCO Tool Catalog

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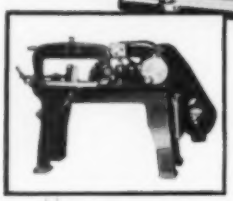
A RACINE "UTILITY"

MAKES METAL CUTTING SIMPLE and EASY

A 15 year old student can learn to efficiently operate a Racine "Utility" in less than 30 minutes.



RACINE "UTILITY"
Wet Cut Model

RACINE "UTILITY"
Dry Cut Model

Racine "Utilities" are used in today's large and small industries as an auxiliary saw for all-around metal cutting work. They are the ideal saws for training students between school and job.

Capacity 6" x 6", these saws will accurately cut any metal from soft aluminum tubing to hard alloy steels. Both the pressure and feed of the saw blade are controlled hydraulically. All moving parts are guarded to prevent accidents — most important in school training equipment.

"Utility" Wet Cut Model is provided with a base containing reservoir for coolant. "Utility" Dry Cut Model is the same as "wet cut" model in every detail except base consists of four sturdy iron legs.

Larger Racine Hydraulic Metal Cutting Saws in capacities of 6" x 6" to 20" x 20" are also available. WRITE for complete metal saw line catalog No. 70-C. Address RACINE TOOL & MACHINE CO., 1780 State St., Racine, Wisconsin.

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TOOL & MACHINE CO.
RACINE, WISCONSIN

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Drop Forged
LATHE DOGS

ARMSTRONG Lathe Dogs give extra service because they are drop forged from selected open hearth steel, and, are heat treated to extreme toughness and stiffness. Hubs are made large enough to permit re-tapping, screws are also of special analysis steel and are hardened at the point to prevent upsetting. ARMSTRONG Dogs come in 10 types with square head or safety headless screws, with straight or bent tails. They are carried in stock by your local ARMSTRONG Distributor.

Write for New S-48 Catalog, just released.

ARMSTRONG BROS. TOOL CO.
5222 West Armstrong Ave.
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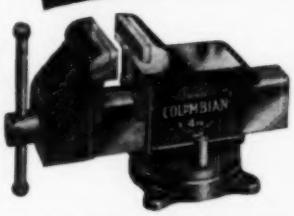
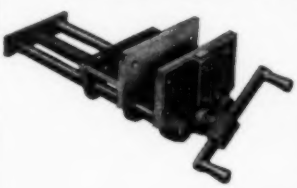
New York and San Francisco

New Columbian 804 Steel Welded Workshop Vise
With Handy Removable Pipe Jaws



The Columbian 804 Work Shop Vise is a rugged all-purpose vise of steel construction — fabricated by arc welding. Front and back jaws are welded from heavy steel. Screw and handle are cold rolled steel. Each Columbian 804 is finished in red enamel and packed in individual cartons.

Columbian Workshop Vise



★ Columbian Continuous Screw Woodworker's Vises are furnished with hard wood handles — or may be equipped with ADJUSTABLE STEEL HANDLES as above, to eliminate handle breakage, speed operation and provide extra leverage.

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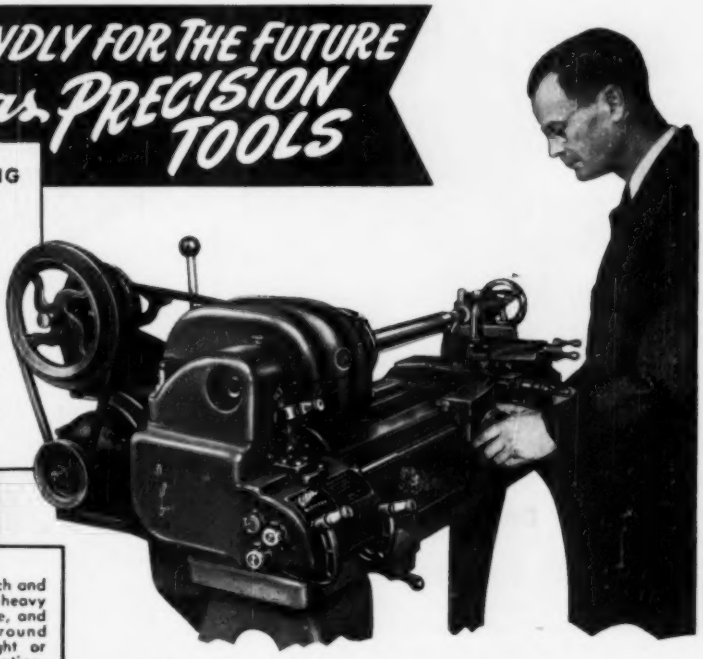
9022 Bessemer Avenue • Cleveland 4, Ohio
THE WORLD'S LARGEST MAKERS OF VISES

BUILD SOUNDLY FOR THE FUTURE WITH Atlas PRECISION TOOLS



AMERICA'S OUTSTANDING BENCH LATHE VALUE

- 10" Swing – 24"–36" between centers.
- Quick-Change Model gives instant selection of 54 threads or feeds.
- Timken tapered roller bearings.
- Precision ground bed.
- 16 spindle speeds—V-belt drive.
- Back gears for extra power.
- Instantly reversible power cross and longitudinal feeds.

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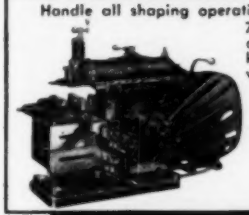
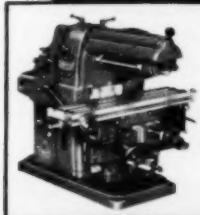
12¾" and 15" bench and floor models. Extra-heavy head, column, table, and base. Precision-ground table tilts 90° right or left. Exclusive "floating-drive" spindle, with deep-grooved ball bearings. Low-cost accessories for all drill press operations.

Atlas SHAPERS

Handle all shaping operations within a 7" stroke—dovetailing, keyseating, vertical and angular cuts. Timken bearings. 4 speeds. Operates from ½ HP motor.



Atlas MILLERS



Gives you full range of milling operations—slabbing and facing cuts, end milling, keyways, boring, layout work. Timken bearings. 8 spindle speeds. Operates from ⅓ HP motor.

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Whatever your students aim for in industry . . . engineering, plant management, machine tool specialization . . . you help them build soundly for the future by teaching *all* metal-working fundamentals.

Atlas tools make it practical for you to provide this *complete* basic training *now* — and to *expand* your program for future enrollment increases. Atlas advanced engineering and production methods give you top values. Compact design helps you take advantage of "open spots" you may have considered unusable. Budget-wise and space-wise, you get more pupil stations in your shop . . . plus precision capacity, and versatility that insure fast student progress.

Keep Atlas tools in mind when planning your equipment needs for next term. Send coupon today for detailed information on these *industry-proven* machines.

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Please send latest information about Atlas tools. I am especially interested in:

☐ 10" lathe ☐ 6" lathe ☐ drill presses
☐ Miller ☐ Shaper ☐ Also woodworking tools.

Name_____

Address_____

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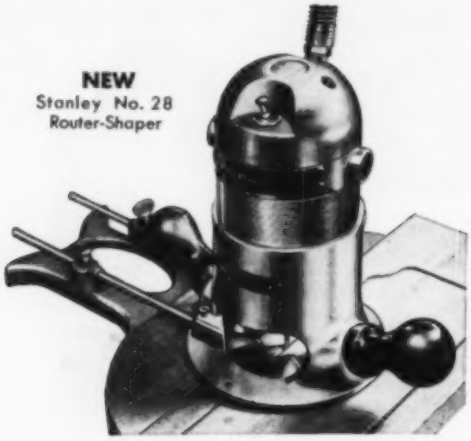
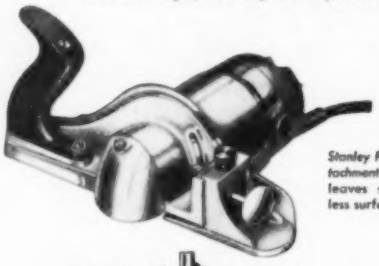
NEW
Stanley No. 28
Router-Shaper

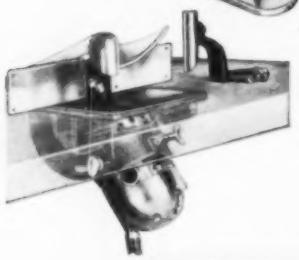


Router, shaper and power plane — all in one tool

Now you can teach your students the use of three important woodworking tools with an investment in only one motor. This new high quality, ½ H.P. motor — 18,000 r.p.m., contains oversize sealed ball bearings for smoother cutting and greater power. The motor attaches quickly and easily to router base, to shaper plate, and to power plane attachment. Write today for complete Cat. 609. Stanley Electric Tools, Educational Dept., 480 Myrtle St., New Britain, Conn.



Stanley Power Plane Attachment. Spiral cutter leaves smooth, waveless surface.



Stanley Table Shaper Plate for mounting on bench or table. Has exclusive tilting arbor feature.

STANLEY
Reg. U.S. Pat. Off.

HARDWARE • HAND TOOLS • ELECTRIC TOOLS • STEEL STRAPPING

STOP HACK SAWING DRUDGERY!

USE HAND-I-HACK*

ONE HAND CARRIES IT

The only TRULY PORTABLE Hack Saw Machine.

Hand-I-Hack is the first genuinely portable hacksaw machine. You can take it *to the work*. It will cut in *any* position. Save elbow grease—the most costly power known.

Simply clamp your work in the HAND-I-HACK swivel vice . . . set blade . . . start motor. HAND-I-HACK does the rest. Shuts off automatically when cut is finished.

HAND-I-HACK can do 95% of all sawing jobs usually done by hand. Uses low-cost 10" hand blades which last 3 to 5 times longer . . . because HAND-I-HACK operates on draw cut and lift return principle. Capacity 3" x 3".

INSTRUCTORS: Write today for full information. SCHOOL SHOP DEALERS: Write for our dealer proposition.

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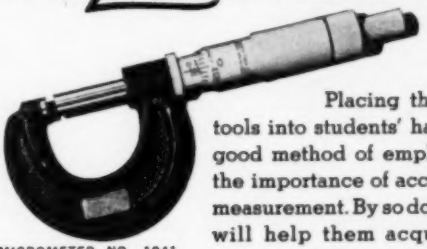

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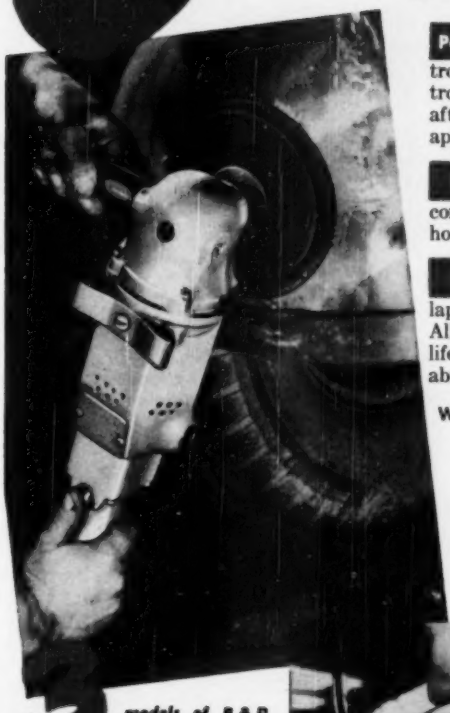

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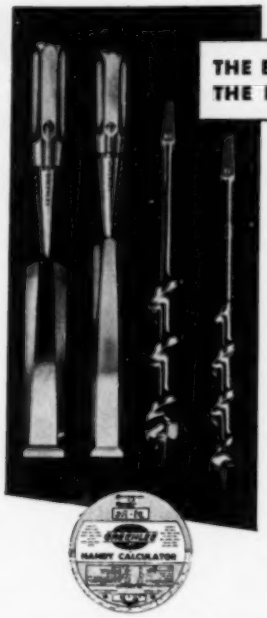

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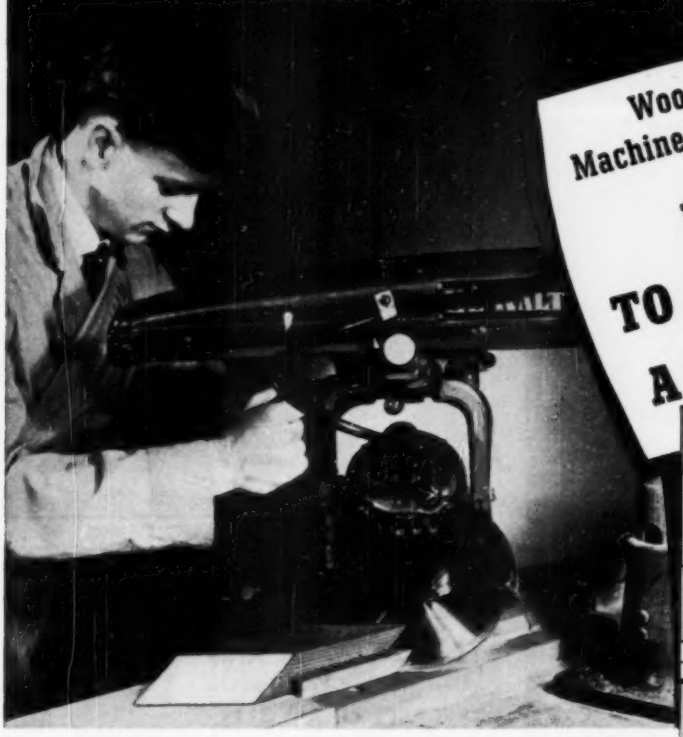

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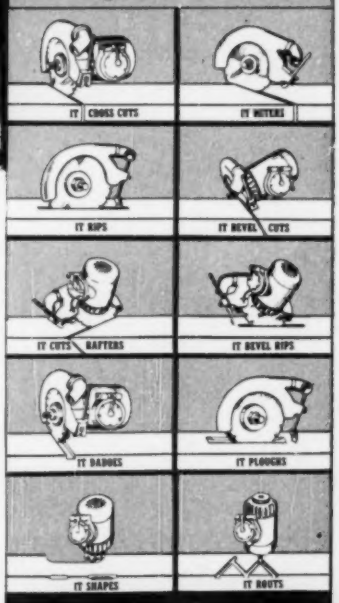

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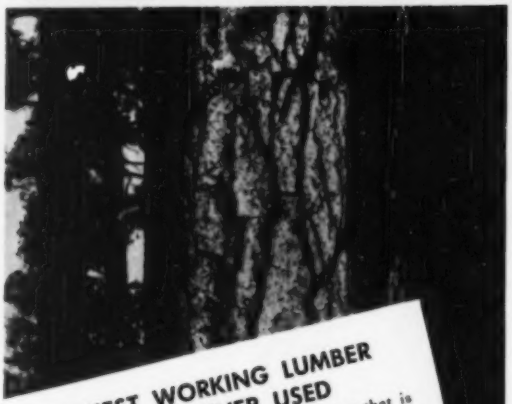

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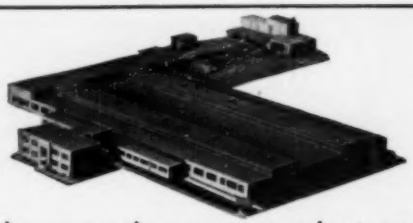

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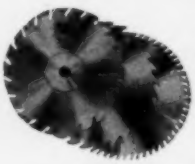

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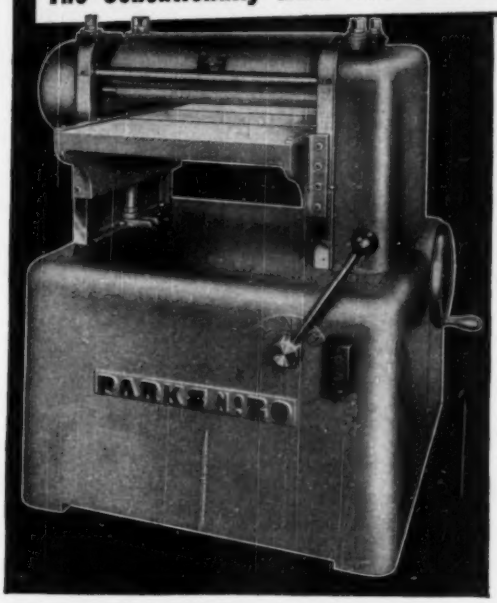

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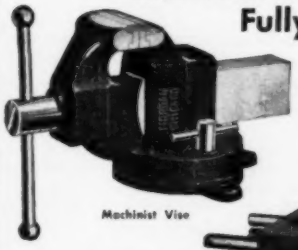

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POP SENT "DAFFY" DILLY TO THE TOOL ROOM FOR A SUPER-SHEAR-- LOOK WHAT HE BRUNG!
YESTIDDY HE WAS GONE AN HOUR HUNTIN' A LEFT-HANDED MONKEY-WRENCH!
BET THE LI'L SUCKER WAS WEANED ON A PICKLE-- A DILLY! GET IT?

Daffy's error may be excusable, because to many shop workers, foremen, production and purchasing heads the patented Nicholson Super-Shear* File is still "news"—even though it already has had several years of popular usage in various industries.

*Reg. U. S. Pat. Off.

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VOL. 38, NO. 8 OCTOBER, 1949

Industrial Arts and Vocational Education

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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540 NO. MILWAUKEE ST., MILWAUKEE 1, WIS. | EASTERN OFFICE: 330 WEST 42ND ST., NEW YORK 18, N.Y.

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The Magazine and the Teacher

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine has quite a job on its hands, and it appeals to its readers for aid in making the periodical as helpful as possible.

Problems and projects are always in demand. Shop teachers in general are always looking for something new. Probably you have just what someone else wants for his classes. Please send in some new designs; your confreres will bless you for it. Projects for the machine and metal shop, woodworking, auto shop, and electricity, are specially sought after.

As to personal news, association news, and general news, we are always anxious to let our readers know about what is happening in your shop, school, and teachers' organization. Send us this information and we will be glad to publicize it.

You may also have been fortunate enough to get a new shop, or you may have revamped your old one. What you have done may be helpful to others. Make a story of it and send it to us together with your shop layout and some photographs.

A Reminder

Have we received your change of address? We cannot guarantee to replace magazines that have been lost because they were sent to your last year's address.

Remember to give your old address as well as the new address, and be sure to put down your zone number.

This Month's Cover

The cover illustration for October pictures Gerald Grabcheski, a student in one of the senior high schools of Elizabeth, N. J., shaping his plaster cast into a model car which he intends to enter in the annual competition staged by the Fisher Body Craftsman's Guild.

He seems to be thoroughly interested and we hope he wins.

Coming Conventions

Oct. 9. Association of Trade and Technical Administrators of New York State, meets at Lake Placid, N. Y. Headquarters, Lake Placid Club. President, Dr. Edward H. Lang, Smith Technical High School, Syracuse, N. Y.

Oct. 13–14. Oklahoma Vocational Agriculture Teachers Association, at Oklahoma City, Okla. Headquarters, Municipal Auditorium. Convention chairman, G. E. Gaines, Watonga, Okla.

Oct. 13–14. Oklahoma Vocational Association, at Oklahoma City, Okla. President, C. E. Paul, Central High School, Muskegee, Okla. Secretary, E. P. Chandler, A. & M. College, Stillwater, Okla.

Oct. 17–18. South Dakota Industrial Arts Association. District meetings at Rapid City, Sioux Falls, Pierre, and Aberdeen, S. Dak. Secretary, Roy Sterrett, Brookings, S. Dak.

Oct. 17–18. South Dakota Vocational Association. District meetings at Rapid City, Sioux Falls, Pierre, and Aberdeen, S. Dak. Secretary, O. H. Schwentker, Rapid City High School, Rapid City, S. Dak.

Oct. 20–21. Minnesota Vocational Association, at Minneapolis, Minn. Headquarters, Radison Hotel. Convention chairman, Clarence Funk, Vocational Division, Shubert Bldg., St. Paul, Minn.

Oct. 20–21. Minnesota Trade and Industrial Education Association, at Minneapolis, Minn., in connection with the Minnesota Vocational Association. Headquarters, Radison Hotel.

Oct. 21. Industrial Education Section, Maryland State Teachers Association, at Baltimore, Md. Headquarters, Broadway Junior High School, Broadway and N. Ave., Baltimore, Md. Chairman, Arthur A. Dick, Industrial Education Section, Board of Education, Baltimore County, Towson 4, Md.

Oct. 21. North Dakota Vocational Association, at Minot, N. Dak. Secretary, Shubel D. Owen, North Dakota Agricultural College, State College Station, Fargo, N. Dak.

Oct. 21–22. Four-State Regional Conference on Industrial Education, at Pittsburg, Kans. Headquarters, Kansas State Teachers College. General chairman, Dr. J. V. Melton, Pittsburg, Kans.

Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879.
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Published monthly except during July and August.

Subscription Information. — Subscription price in the United States, Canada, and countries of the Pan-American Union, $3.00 per year, payable in advance. Postage, foreign countries, 50 cents. Copies not over three months old, 35 cents; more than three months, 50 cents.

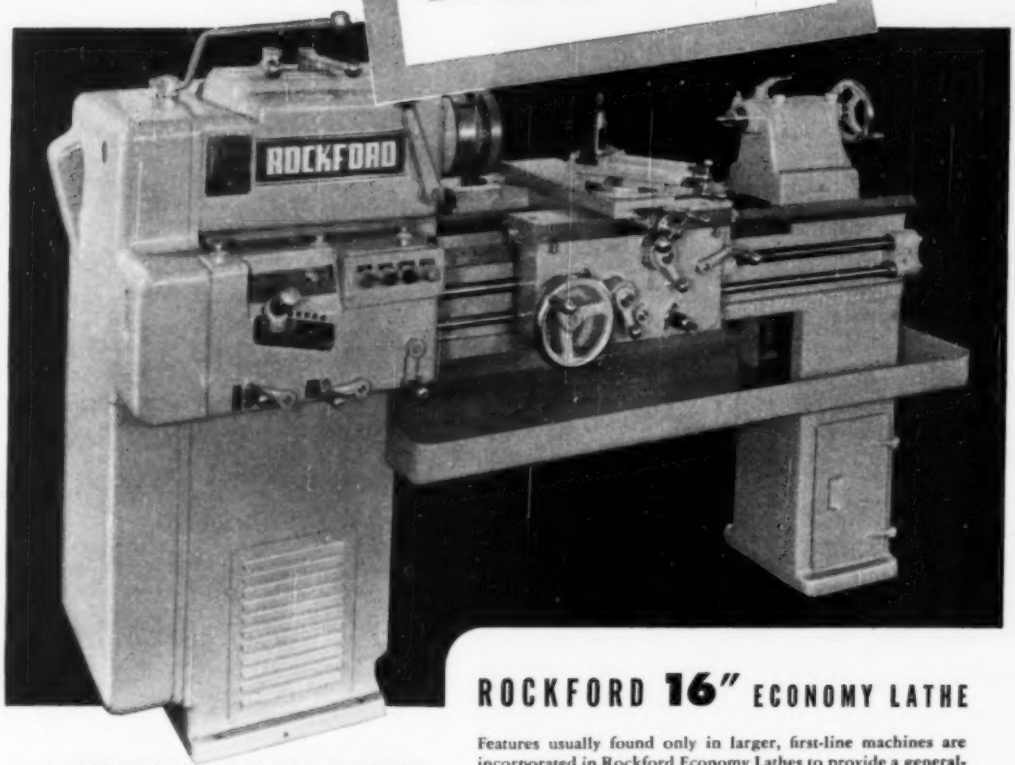
Discontinuance. — Notice of discontinuance of subscription must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration. Notices of changes of address should invariably include the old as well as the new address. Complaints of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

Consider These Features in a

Medium-Sized Economy-Priced Lathe



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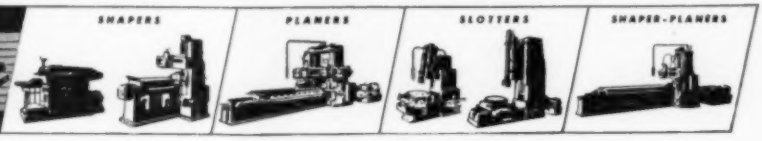


-IAVE-
OCTOBER . . 1949

Establishing and Maintaining Relationships With Management, Labor, and the Public

S. LEWIS LAND
Director, Vocational Teacher Education
The Pennsylvania State College
State College, Pa.

Programs of vocational industrial education are maintained in the public schools for two major purposes: (1) to provide young people with basic information and skills needed for preparation for entrance upon and success in life occupations and (2) preparation of qualified workers for service in industrial establishments. To accomplish these objectives and to assure the adequacy and success of his program, it is necessary for the local director of vocational education and those employed in his program to establish and maintain close working relationships with management and labor.

What are some factors of importance to management and labor in measuring the adequacy and success of a vocational training program? Among others are the following eight measuring devices which the local director may effectively apply in determining the success or lack of success of his training program:

1. Do training programs in the schools make possible reduction in the amount of time required in adapting new workers to production?
2. Do supplementary or evening trade extension programs conducted in the schools make possible the more effective utilization of available manpower?
3. Do training programs in the schools make possible the conservation of the time of the supervisory personnel?
4. Do training programs in the schools make possible the more effective use of production machines for production?
5. Do training programs in the schools make possible reduction in loss of materials and machines as a result of breakage and poor workmanship in the industrial plant?
6. Do training programs in the schools make possible reduction in the accident rate among workers employed in the plant?
7. Do training programs in the schools make possible reduction in the rate of labor turnover?
8. Do training programs in the schools make possible reduction in absenteeism among workers employed in the plant?

In a survey of ninety of the principal industrial establishments in one state made during the peak of war production before the close of the recent war, the effectiveness of organized training programs in the schools in all eight of these categories was clearly demonstrated.[1]

Local directors of vocational education employ several methods in establishing and maintaining sound working relationships with industry and labor including: (1) advisory committees; (2) firsthand contacts with plant managers, superintendents, and foremen; (3) firsthand contacts with labor unions; and (4) effective public relations in keeping the public thoroughly informed of the program conducted by the schools.

[1] "Training for Industry," a report of a survey made by the author and published by the New York State Education Department, Albany, N. Y.

I. Advisory Committees

A pattern for the organization and function of advisory committees has been established in the full-time vocational training program conducted by local boards of education for many years. In at least one state advisory committees are made mandatory through the state law regulating the establishment of local vocational programs. During the war training program by regulation of the U. S. Office of Education such advisory committees were required wherever local boards of education organized war training programs.

How Selected. In the selection of members to be appointed to the advisory committee, local school officials make every effort to insure full and adequate representation of management and labor. This is accomplished through the appointment of persons who represent organized groups of employers and employees in the community.

Information concerning employer associations can be secured from local chambers of commerce, better business bureaus; or, in the absence of either a chamber of commerce or a better business bureau, some of the leading employers in the community supply the school authorities with a list of employer associations and their respective officers.

Information concerning labor organizations and their respective officers can usually be secured from the Central Labor Union.

After complete lists of all employer associations and labor unions in the local community have been compiled, school authorities frequently request each organiza-

tion to submit nominations for membership on the local advisory committee. From the nominations submitted, the membership of the advisory committee is selected. Appointments from nominations which are submitted are made by the local board of education.

Although counsel and advice from other interested groups are necessary, management and labor are the groups most vitally concerned and also are in the best position to supply accurate factual information regarding the personnel requirements of industry.

Craft Consultants and Craft Committees. In communities where the training program serves a great variety of industries, it may be desirable to appoint, to the advisory committee, craft or occupational subcommittees or consultants to advise the committee on matters having a direct bearing upon particular crafts and occupations. Consultants need not necessarily attend all meetings of the committee, but may attend any meetings at which matters of interest to their particular craft or occupation are considered.

Functions of Advisory Committees. The employer representatives on the committee are in the best position to supply the committee with information concerning needs for additional employees, industrial trends in the community and the types of skills and educational training required by needed workers.

The labor representatives on the committee are particularly qualified to provide the committee with information concerning the desires of organized labor in the building and maintenance of acceptable labor standards.

School officials keep the committee informed of changes in the training program and constantly secure from the committee information needed to keep the program geared to the needs of local industry. This information includes data concerning occupations for which training should be offered, numbers which should be trained to meet the needs, and changes in equipment, processes, and methods employed in industry.

Representatives of industry, working through the committee, serve as a liaison group between the schools and industry, interpreting the schools to industry and interpreting industry to the schools. The representatives of labor, working through the committee, likewise serve as a liaison group between organized labor and the schools, interpreting organized labor to the schools and interpreting the schools to organized labor.

Bulletin 3277 of the U. S. Office of Education on "Representative Advisory Committees"[2] specifically charges the advisory committee with the responsibility for making recommendations concerning such matters as:

1. Training needs and training possibilities
2. Types and amounts of instruction
3. Qualifications of instructors
4. Types and selection of equipment
5. Instructional materials
6. Public relations and publicity
7. Production work in school shops
8. Counseling and guidance procedures

The local advisory committee is not endowed with administrative authority. Its function is to offer advice, by means of counsel with the school authorities, on matters concerning the training program. The local board of education is charged with the responsibility of administering the program.

The establishment of an advisory committee and, in larger programs, a series of additional craft committees is essential to the successful operation of a local vocational training program.

Such advisory committees are in themselves essential, but particularly in larger communities with diversified industries, and even in smaller communities, the work of such committees must be supplemented by firsthand contacts with management and labor in each of the industries served.

II. Maintaining Contact With Management

Top Management. It is important that contacts be established and maintained with *top management,* including the executive personnel as well as with managers, superintendents, foremen, and others in an administrative or supervisory capacity. These contacts are maintained for the school by one individual or by several individuals, depending upon the size and organization of the school.

Management and Supervisory Personnel. In small schools, the director establishes and maintains contacts all the way along the line with management and supervisory personnel. In larger schools and programs, the principal of the school or the director of vocational education may maintain contact with executive management; a co-ordinator may maintain contact with the personnel, industrial-relations and employment staffs, and, finally, instructors may maintain contact with plant superintendents and foremen. The suggestion of maintenance of contact on these three levels implies no intention of establishing a pattern of co-operative effort which would prevent or discourage the maintenance of contacts by any of the three groups of school personnel with any of the three groups of plant personnel. In larger programs where such school personnel is possible, the management of the school, the principal, or the director of vocational education, in addition to establishing and maintaining his contacts with top management, sees to it that the contacts all the way along the line are co-ordinated.

The need for maintenance of contacts on these three levels of responsibility is also confirmed by a functional analysis of problems involved in the training program. It is necessary to maintain contact with executive management to determine policy. It is necessary to maintain contact with the personnel, the industrial-relations and the employment staffs to determine the numbers to be trained and types of courses to be offered. It is necessary to maintain contact with plant superintendents and foremen to determine the course content and changes and trends with regard to processes, machines, and materials.

Visitations to the Plant and School. It is important for the vocational director, the co-ordinator, and the instructor to maintain contacts with plants served by the school through visitations to the plant. This, however, is not adequate. It is likewise important for plant management, superintendents and foremen, training directors, and others concerned with plant personnel to visit the school to get firsthand information concerning the available facilities in the school, its instructional staff and its possibilities for service to the plant.

It is frequently possible to arrange to have large groups, representing a particular industry, visit the school in a body or in smaller groups if numbers are too large to enable the entire group to visit the school as a unit. Chambers of commerce usually have complete and up-to-date lists of officers of local trade associations and will cooperate with representatives of the board of education in completing arrangements for such visitations. Some chambers of commerce also maintain standing committees on education and training which are representative of all types of industries in the community. It is important to have both these groups composed of men with diversified interests and groups representing single industries visit the school and learn firsthand of the facilities available for training.

Visitations of school personnel to plants and visitations of plant personnel to schools are best accomplished on a planned

[2] *Representative Advisory Committees — A Manual for School Authorities and Committee Members,* Misc. 3277, Division of Vocational Education, Office of Education, Washington, D. C.

schedule prepared in advance. To meet constantly changing problems which will arise from time to time, changes in the schedule will be necessary, and such schedules will have to be under constant revision. To insure complete coverage of all of the plants in the community, it is important that schedules should be developed in advance and visitations made on the basis of these schedules.

III. Maintaining Contact With Organized Labor

Organized labor, as has already been pointed out, is represented on advisory committees. The advice and assistance of organized labor in the formulation of policies and in the development of the program are made possible through representation on these committees.

This, however, is not enough. It is important that school officials should also maintain contact with all the organized groups representing labor in the community. This can be done both through attendance on the part of school officials at meetings of organized labor groups and also by inviting officials of labor groups to the school. Each labor organization is kept fully informed of any training programs in operation in its field. Its advice is constantly sought in order that the program may be kept up to date.

IV. Informing the Public

The local director utilizes several methods in keeping the public informed about his program including (1) talks before civic organizations and service clubs, (2) radio publicity, (3) newspaper publicity, (4) handbills, (5) posters, (6) school visitations, (7) billboards, and (8) exhibits.

Civic Organizations and Service Clubs. The local director frequently maintains membership in various civic organizations and service clubs, such as the local chamber of commerce, Rotary, Kiwanis, Lions, Zonta, and other similar organizations. Membership in these organizations provides opportunities for firsthand contact with large numbers of representative industrialists in the community. Except in the small community it is not possible for the local director to maintain membership in all the organizations. It is possible, however, in most cases, for him to arrange to appear before all of the organizations to present his program from time to time as changes in the program and other factors warrant the dissemination of up-to-date information concerning the program.

The membership of civic organizations and service clubs is usually truly representative of the business and industrial life of the community. By promoting training programs through these clubs and organizations a large representative group of business and industrial leaders is reached.

The members of these organizations are generous in co-operating with the vocational school officials. Arrangements can frequently be made to have them come to the school individually and in groups to inspect the facilities of the school. This serves as an effective means of giving business and industrial leaders in the community accurate firsthand information concerning the available facilities in the school for the training of needed industrial workers.

Radio Publicity. The radio is one of the most effective means of disseminating information concerning training programs. Radio stations are generous in providing adequate time for a series of programs, an occasional program, or *spot* announcements. When arrangements are made for a series of programs and when these programs are scheduled on a weekly basis, radio stations usually plan programs in multiples of 13, that is, four sets of programs each year. It is frequently possible to arrange for 15-minute broadcasts once each week for periods of 13 consecutive weeks.

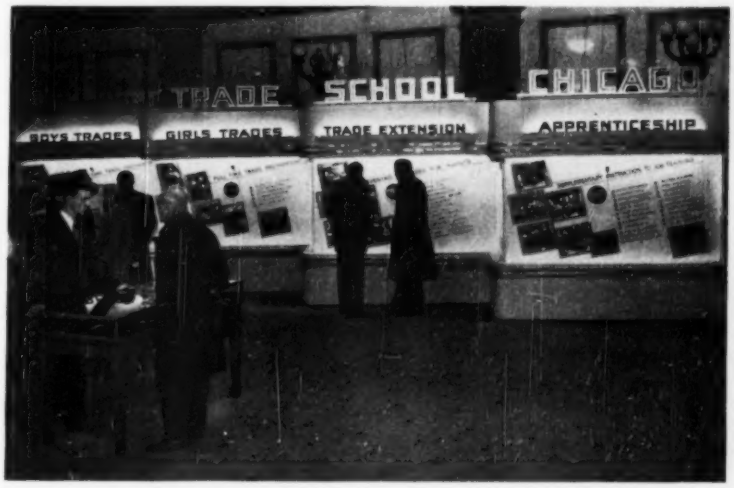
When some new phase of the program justifies such publicity, radio stations will usually arrange to provide 15-minute or 30-minute periods for the dissemination of information of interest to the public. In connection with the recruiting of candidates for training and the announcement of new courses established, radio stations will frequently arrange spot announcements of one to three minutes.

Newspaper Publicity. It is the responsibility of the local director of vocational education to keep the public informed of the program through the local press. This can be done in two ways: (1) through the preparation of prepared articles furnished by agreement to the press and (2) through providing information to staff reporters who in turn prepare articles for publication. In either case, it is necessary to establish and maintain contact with the editorial staffs of the newspapers so that the program will be kept before the public.

Such news releases to be of greatest effectiveness in promoting the program must be timely and carefully prepared. Announcements should be made through the local press of the beginning of a new term in the training program and of new courses which are added from time to time. Accurate and adequate information concerning place and time of registration must be incorporated in these news releases.

Handbills. Handbills for house-to-house distribution or for distribution in plants have been used effectively in announcing the beginning of a new term in training programs or the inauguration of a new course. Such handbills should contain accurate information in condensed form so that the essentials can be had with a minimum of reading. Plans for the distribution of handbills should be made with care so that they actually get into the hands of interested persons.

Posters. Posters of adequate size attrac-



Washburne Trade School exhibit at the Chicago Public Library attracted thousands of visitors

tively prepared and placed in conspicuous locations on the bulletin boards of industrial plants, in post offices, in schools, and in other places where people congregate are effective means of keeping the public informed of the training opportunities that are available. It is important that such posters contain the opening dates of courses, date and place for registration, and the list of available courses. It is likewise important that the information be well organized and arranged in an attractive manner on the poster.

School Visitations. It has already been suggested that opportunities should be afforded both management and labor to visit the schools to get firsthand information concerning available facilities. It is of no less importance to provide opportunities for parents and the general public to visit the schools for the same purpose. The popular custom known as *open house*, long established and well attended, is an effective means of spreading information and creating public interest. Such events should be well publicized through the newspapers and by means of notices carried by the student body to the parents.

Billboards. Billboards of commercial size have been used to advantage in publicizing training programs. These are frequently erected on the premises of the school. They have also been erected on the premises of industrial plants or at other points where they are frequently seen by workers in industrial plants and others who would profit from enrollment in training programs. It is important that the information on these billboards be kept up to date. They stand as a constant reminder of available training facilities for the training of skilled workers for industrial plants.

Exhibits. School exhibits are utilized to advantage in placing before the public information concerning the facilities of the school. These exhibits are sometimes conducted in the school itself. Sometimes they are conducted in connection with other exhibits sponsored by the local chamber of commerce or in connection with county fairs and other similar events. Such exhibits to produce greatest effectiveness, should be attractively arranged. A representative of the school should be on hand at all times to answer questions and to distribute available literature.

The sound promotion of his program is one of the most important of the responsibilities of the director.

These are some of the techniques which the local director may employ in the establishment and maintenance of sound relationships with management and labor and in the sound promotion of his program with industry, business, financial institutions, parents, and the general public.

A Brief Training Course For Conference Leaders

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(*Continued from page 236 of the June, 1949, issue*)

SESSION II

Gathering the Data or Facts

I. State the problem and the purpose.
II. What motives will apply?
  a) Financial gain
  b) Comfort
  c) Health and safety
  d) Honor and praise
  e) Publicity
  f) Good will
  g) Prestige
  h) Pride, ambition
  i) Ease of work or efficiency
  j) Saving time or energy
  k) A better product
  l) Departmental rank
III. What needs dramatization?
IV. How can it be dramatized, visualized?
  a) By speech
  b) By picture
  c) By a skit
  d) By charts, etc.
  e) Models
  f) Printed materials
V. What needs calm reasoning?
VI. How to bring out and develop facts?
  a) Questioning
    1. Leading questions
    2. Challenging questions
    3. Thought questions
VII. Recording data or facts.
  a) Selection of facts for recording
  b) Writing the facts
    1. On blackboard
    2. On paper
    3. Individual notes

Getting the Data or Facts

Perhaps the first step in this process is the statement of the problem and the objective or aim. It was pointed out before that these two are very much alike, but even so, both should be stated, since each lends a specific slant to the problem at hand.

DETERMINE THE MOTIVE FORCE TO USE

The gathering of facts which are important needs some definite motivation. An appeal should be made to the motive forces that have a definite bearing on the case. For instance, the problem involved may be stated thus: should women be required to wear uniform dress in the factory? The objective in this case may be stated: to get women to wear clothing which will facilitate good safe work.

In selecting motives to which direct appeals might be made, one must consider their bearing on the problem. Obviously financial gain as a motive would not be of much help. Neither would honor, praise, good will, prestige, or the like, have much to motivate such a problem. However, health and safety has a direct bearing on the situation. Comfort may or may not have much appeal, but ease of work and added efficiency are incentives that are readily usable.

If the problem were: should candy machines be established or installed in the factory? The aim or objective might be stated in this manner: to improve the feeling, tone, or morale, in the factory. This assumes that such a service had been requested by someone or at least it has been thought by someone to be worth while.

AIMS OR PURPOSES

When a conference is involved, aims or purposes should not be prejudiced. A prejudiced aim might be: to get candy machines installed in the factory or the reverse, to keep candy machines out. Neither of these aims would be satisfactory because they have both taken a predetermined attitude which would kill the problem for a conference discussion.

Motive forces which may apply in this case are: if it is co-operative, financial gain may apply; comfort would be a strong motive, while health and safety might be made applicable. The greatest appeal may be made to the more fundamental drives, such as hunger; sex; temperature control; curiosity or exploratory urges; the creative urge; urge for security, locomotion, protection, or the social drives of family; competition; rivalry; and gang or group spirit may be used to advantage.

The point to keep in mind is that these motivating forces should be determined in advance in order that the most effective use may be made of them. Other motives such as fear, loyalty, pride, and ambition may have their place in motivation of a problem discussion.

WHAT NEEDS DRAMATIZATION?

Vitalizing a conference may be accomplished by a certain amount of dramatization. A short skit presenting the problem will add interest and zest. A case study, well presented in a more or less dramatic form, will bring out the issue in a more exaggerated form, but such exaggeration adds realism to the issue and serves as a definite stimulus for the solution of the problem.

The first problem mentioned — that of women's dress in the factory — could be introduced by a short dramatic skit, showing what might happen when improper wearing apparel is being worn. A short sound film on the subject could be very effective because it can be condensed and made more perfect in both word and action.

Dramatization may be accomplished by a speech, a picture, a skit, or a reading well given.

Some individuals can tell a case or give an instance in more dramatic fashion than others. Thus it is well to secure the services of one who is able to dramatize his story. The effect will pay for the added effort required to get the proper individual to give it.

Short motion picture films accompanied by sound are perhaps the most effective.

Next to the motion picture film in effectiveness is the talking film or series of projected still pictures with a sound record accompanying it.

The skit is effective only to the extent of its perfection. A poor skit is perhaps worse than nothing, because it may result in a farce and thus defeat its purpose.

Another milder form of dramatization is produced by the use of charts, graphs, models, and well written cases which are duplicated so that all may have them.

SOME PROBLEMS NEED ONLY CALM REASONING

Here the leader draws upon the combined experience of the group for the facts and opinions, which are the expressions of feelings or attitudes. Facts for this reasoning are brought to light by questioning and discussion. Leading questions are frequently used to get an expression on things already known but not properly stated for use.

Thought is stimulated by the use of challenging questions. These questions should be prepared in advance. Questions which challenge the ordinary thought on a problem should be used. If a person's habituated thought or idea is challenged he is very likely to talk. However, the purpose here should not be to start an argument, but rather to get individuals out of their smug realm of thought.

There is perhaps very little difference that can be seen between the challenging question and the thought question. This one difference may be considered — the challenging question is one which generally attacks fairly well-established opinions and attitudes. In other words, there is usually a definite feeling tone or attitude already built up around the idea. The thought question, on the other hand, usually concerns itself with the weighing of facts or the recall of experiences or ideas which have a bearing on the case.

EXAMPLES OF QUESTIONS

A leading question: Isn't it true that women's ordinary clothing creates hazard in a factory?

A challenging question: Is it true that women are safer workers than men?

A thought question: Why is it a good policy to require women to wear certain types of clothing in a factory?

RECORDING THE DATA OR FACTS

This is an important phase of conference leadership. It involves knowing what facts are important enough to record, how to get them worded for recording, how to combine suggestions of several individuals into one statement which will be acceptable to all contributors, and how to give proper recognition or credit for the suggestion.

These facts should be recorded on a blackboard or large paper designed to take the place of a blackboard.

It is frequently more practical and economical to provide for easel and paper than a blackboard. An advantage attributed to the easel and paper is that the material can be preserved for additional meetings or for records, while material on a blackboard must be erased to give room for other facts. These facts recorded on paper can be taken down, summarized and duplicated for future reference.

The following will illustrate the conference method for getting facts:

1. *Problem:* What information should a new employee be given?
2. *Purpose:* To discover what information should be given a new worker.

In this conference the following facts were presented:

BILL: I think the new employee should be told about the plan of pay.

LEADER: Let's put this on the blackboard; tell him about the: payment plan, shifts, safety rules, B.E.I.P., eating arrangements, recreational activities, line of authority, overtime work and pay, his specific job, importance of job, promotional plan and seniority rights, smoking rules, toilets and washrooms, first aid, insurance plan.

SAM: I think he should be told about the system of shifts and his particular shift.

LEADER: Let's record that.

MARK: I think he should be told about the safety rules.

LEADER: That's a good point.

JOHN: Well, I think he should be told about the (B.E.I.P.) bonus system.

LEADER: That's fine.

RALPH: It seems to me that he should be told about arrangements for eating.

LEADER: That is something that would interest him, isn't it?

SAM: Well, I was interested in the recreational provisions. It seems to me that he should know something about that.

LEADER: All right, let's put that down.

BOB: I think he should be told about the line of authority.

LEADER: Yes, that does seem important, doesn't it? Let's put it down.

JOE: What about overtime work and pay?

LEADER: He would want to know about that, wouldn't he?

BILL: I think the most important thing to tell him is just what his job is to be.

LEADER: Do you all agree with that? Let's include it.

BOB: He will need to know how important that job is, too.

LEADER: That would add to the interest of the job, wouldn't it?

SAM: Seems to me that he should be told

something about the promotional plan.

LEADER: He would want to know that, wouldn't he?

RALPH: Would seniority be included in that?

LEADER: Do you all think that is a good additional point?

ALL: Yes.

LEADER: Then let's add that to the other point, since it is part of the promotional plan.

JOE: I think he ought to know about the smoking rules.

LEADER: Is that important enough to include here?

ALL: I'll say so.

SAM: I think he should know about the toolrooms and how to get tools. They had me running all over the place my first few days trying to get tools.

LEADER: That is something that he needs to know the first day, isn't it?

BILL: How about toilets and washrooms?

LEADER: He might need to know about that, but wouldn't he learn that better and quicker when the time comes?

SAM: Yes, but it might save time if he were told in the beginning.

LEADER: O.K. Let's add that.

JOE: He ought to be told about First Aid, and its importance.

LEADER: Perhaps his first day or so would be his most dangerous. It might be very important.

BILL: Shouldn't he be told about the insurance plan here at the plant?

LEADER: Do you mean workman's compensation?

BILL: Yes, but in addition to that there is another type of insurance provided and he should know about it, I think.

LEADER: Do you all agree to that?

ALL: Yes.

LEADER: We have now worked out 15 different things on which new workers should have information.

For our next session we shall try to determine how facts should be organized for effective use.

Remember that we meet on time and close on time, so be sure that you do not waste the other person's time, nor miss any important facts yourself.

(To be continued)

Some Leaders in Industrial Education

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(Continued from page 265 of the September, 1949, issue)

William Elmer Roberts (Continued)

Variety in the American Concept

Because many supervisors and teachers, in all sections of the country, worked independently on this problem of synthesis of the desirable elements in the two systems, Russian and Swedish, and adaptation of the program to conditions in American schools and American homes, it was inevitable that there should be considerable variety in the results. This lack of uniformity in practice and methods in the evolution of what we now know as industrial arts in the schools of the United States has always been a source of annoyance to the formalists in education. Some prominent leaders among the educational philosophers and administrators, who should have known better, have been very critical, not to say scornful, of the industrial-arts program on the ground that its advocates "do not know what they are doing and do not know where they are going."

To these students of education the content and methods of arithmetic, or of English composition and spelling, or of physics or chemistry, are substantially the same in Massachusetts or Kansas or California. They were distressed to observe that industrial-arts teachers in Cleveland and Indianapolis were doing things that were so different from those observed in the schools of New York and Boston and elsewhere, and were following methods of organization of subject matter and instruction so different, that the programs seemed incomparable. So much diversity in approach, methods, and results seemed, in their view, incompatible with a sound educational concept. If American teachers had taken over, without change, either the Russian system or the Swedish system, it seems likely that there would have been fewer protests, less disturbance, and readier acceptance by educational theorists and "philosophers." This speculation is suggested by the widespread interest taken by educators, in other circumstances, in the Herbartian "five formal steps," the so-called theory of "apperception," the "culture-epoch" theory, and other educational ideas imported from abroad.

Freedom to Experiment

On the other hand, freedom to experiment and to study the results of different methods and procedures has been one of the significant contributions of the industrial-arts movement. The fundamental explanation for this freedom was the almost complete lack of knowledge on the part of superintendents and principals concerning the technical details of shopwork and drafting. The school administrator was often convinced by the addresses to which he listened at conventions, by the magazine articles which he read, and by the actual results which he saw with his own eyes at exhibits and in schools visited, that industrial arts was something that he wanted to see introduced into his school system. To bring this about he was, in many instances, obliged to employ a supervisor or a teacher on faith, trusting that the latter knew what needed to be done and how to do it.

The Cleveland schools were most fortunate in experiencing the happy combination of a supervisor having superior ability, leadership qualifications, and vision, and the sympathetic and wholehearted support of the administration continued over a long period of years.

As the program gradually took form in the Cleveland schools, along with other developments and improvements came increasing emphasis on the initiative of the pupil in the selection of projects upon which to work, and in the modification of materials, forms, and designs. It was in connection with this phase of the evolution of industrial arts that Mr. Roberts made an outstanding contribution. The element of the artistic and the beautiful was characteristic of everything he did.

The art element that was so outstanding in the industrial-arts program of the Cleveland schools was first apparent in the work of the high schools. It gradually made its way through the entire system until it permeated every level and every phase of the industrial-arts program. To bring this about, Mr. Roberts held frequent meetings of teachers, at which he and they worked together intensively on common problems of objectives, equipment, instruction materials, teaching methods and devices, organization, and management, always with emphasis on the improvement of design, appearance, finish, and appeal to pupils.

Several years later, beginning about 1906, Mr. Roberts worked out a plan of co-operation between the board of education on one hand, and the Cleveland Normal School and the Department of Education of Western Reserve University on the other, by which classes organized especially for teachers were held in the late afternoons or evenings, on Saturdays, and in the summer. In this way teachers were offered the double incentive of preparing themselves for more effective service and promotion, receiving at the same time college or university credits to apply on the requirements for a degree. Roberts himself taught some of these courses and thus made his entry into the field of professional preparation of teachers. This phase of his career will come up for further attention later.

Development of the Art Element

Having successfully completed his first year as supervisor, having solved at least some of the more pressing problems of organization, and having established some measure of administrative routine, Mr. Roberts turned his attention to certain refinements in methods, procedures, and accomplishment which he had set up as his goals. He announced to his teachers in the elementary schools that, during the ensuing year, the mechanical side of the work would receive somewhat less emphasis, and somewhat more attention would be given to design and the artistic side.

In his meetings with teachers, after school hours and on Saturdays, he helped them work out the details of the methods by which these things were to be accomplished. One of the measures he adopted was to increase the amount of time assigned to clay modeling, and to aid the teachers in increasing their mastery of this medium for the creation of simple, attractive forms of interest to children, chosen from nature and other sources. In this way the appreciation of good form and arrangement gradually developed. Roberts himself in one place described his aim in the early stages as "a general softening of the mechanical lines" in the work turned out.

Construction in paper and cardboard afforded additional opportunities for contributing to this end, through the study of texture, color harmony, and selection, and through the development of appreciation of the importance of space relations and proportions. This same attitude of striving for beauty of form, attractiveness of appearance, and good design, always underlaid by sound construction, was carried through every phase of the industrial-arts program. Roberts was a master of the art of conveying to his teachers his own enthusiasm for these objectives. He helped hundreds of teachers with whom he worked, and through them thousands of children, to know the joy of creating objects of beauty and lasting worth.

Design Applied to Shop Projects

In an address prepared for the 50th anniversary of the inauguration of the manual training work in Cleveland, November 1, 1940, Mr. Roberts refers to the development of appreciation of the relation of art to industrial arts as "one of the finest advances in our work," and as affording him the keenest satisfaction as he looked back through the years. Characteristically, he ascribed the credit for the attainment of high standards to the industrial-arts teachers themselves, and modestly omitted all reference to the inspiring leadership under which the results were accomplished.

In connection with this topic he described the uniformly pleasant relations and attitude of co-operation that always existed between the art department and the industrial-arts department, but felt obliged to confess that "the mutual help has been meager." The reasons for the lack of more significant exchanges of help between the two departments he attributed to two causes. First, art teachers of that period were trained largely to expression in two dimensions, and the three-dimension projects of the industrial-arts shop presented difficulties in design with which they were not prepared or accustomed to cope. Second, the training of the art teachers included very little that prepared them to understand the principles of construction involved in the shop project.

For these reasons the development of the artistic element in the design of industrial-arts shop projects evolved more or less directly out of the efforts of the shop teachers themselves. Among those who did pioneer work along this line were Clarence Brockway of East High School, one of the earliest manual training teachers to be employed in the Cleveland schools, and Frank Noble, a teacher in Central Manual Training School. These teachers developed some new and attractive designs and did some experimental work in design with classes of high school and upper-grade boys. In mentioning these two early teachers specifically, I realize that I am doing grave injustice by omitting the names of many other Cleveland teachers who made important contributions to the evolution of industrial arts.

In connection with these early experiments Mr. Roberts characteristically displayed the qualities of genuine leadership. First, he recognized and encouraged initiative in his teachers, and made it a point to see that those who were disposed to try something new had the opportunity to do so. If necessary, special tools, equipment, and materials were provided. He also aided at every stage of the experiment with advice, suggestions, and friendly criticism.

Second, he brought the work of the experimenters to the attention of other teachers by means of displays, demonstrations, and informal talks at meetings of industrial-arts teachers. In the course of a year many hours would be spent by supervisor and teachers in these meetings scheduled for the late afternoons, evenings, and Saturdays. At the close of each semester the special shop teachers would be freed of teaching duties during part of examination week. Some of this time was needed for sharpening and conditioning tools, building tool racks, and other maintenance work on shops and equipment. Much of this time was also used for teachers' meetings, the results of which counted heavily in building up the department morale and in forwarding the department program.

At these meetings the teachers who had worked up new designs and new projects, new teaching aids and devices, and new methods appeared before their associates and told their stories. After each demonstration, all would join in a discussion of the merits of the ideas presented, ways and means of application or adaptation to other parts of the system, and where and how.

It is difficult to exaggerate the beneficial results flowing from experiences of this type. A wonderfully stimulating effect comes from presenting one's ideas and achievements before a meeting of one's fellow shop teachers, who are really the ones best qualified to judge, followed by friendly and constructive criticism, and expressions of approval and commendation. "These gatherings made long strides in the development of art appreciation in our industrial-arts work."

An Experiment in High School Benchwork

In January, 1904, after these intensive working conferences had

been going on for ten years or so, Mr. Roberts contributed to the *Manual Training Magazine* a brief account of the methods used in Cleveland to improve the artistic quality of the products of the school shops. Several teachers conducted an experiment with benchwork classes of first-year high school grade as a protest against the sawing-planing-chiseling-exercise courses in woodwork which had been dominating the high school manual training for so many years. In setting the stage for the experiment certain general principles were informally agreed upon:

1. That there should be no exercise work pure and simple;
2. That all the work should have in it the elements of beauty — in construction, in proportion, and in decoration;
3. That the pupils should be trained to take the initiative in every way possible; that the work should be arranged to meet individual needs and interests; and that the pupils should be encouraged to put into it as much as possible of their own thought, in design, construction, and decoration.

Experience soon showed that progress could be made only by gradually ascending steps, beginning with very simple assignments and projects, to be made by all pupils. Then each pupil was permitted to select one of several suggested projects, the next step being the introduction of the opportunity to modify the dimensions and proportions of the chosen project. This would be followed by the planning and designing of a project by the pupil under the guidance of the teacher. In the course of time a considerable proportion of the pupils would begin to show some initiative and originality, and would be able to work more and more independently.

Among the results observed were: greater mental activity and originality on the part of both pupils and teachers; greater interest and enthusiasm in the work by both pupils and teachers; self-reliance and initiative were developed; and, finally, standards of workmanship under the new conditions were markedly superior to any attained under the old exercise methods.

Early Interest in Design

In explanation of his abiding interest in design in all phases and departments of schoolwork, Mr. Roberts has recorded that he was strongly influenced by his sister, Mrs. Gertrude Roberts Smith, who was for nearly 50 years instructor and professor of art at Sophie Newcomb College of Tulane University, in New Orleans, La. As a young girl she attended the Massachusetts Normal Art School, in Boston, where she was a fellow student of the late Henry Turner Bailey, with whom a friendship was established that lasted through the years until the latter's untimely death. On the completion of her course at the art school, she was called at once to her life work at Newcomb College.

To his sister, Roberts attributed his primary interest in art expression, and because of this awakened interest he was moved to avail himself of opportunities to improve his understanding and mastery of this field of effort. One of the earliest of these steps was his enrollment in the summer of 1891 in the Sloyd Training School, to which reference has already been made.

Next, in 1900, he enrolled in a summer school course at Harvard University, under the then rather famous artist, Dr. Denman Ross, an exponent of the theory of design. Again, in the summer of 1904, he enrolled in an excellent art course at the Rhode Island School of Design, Providence, where he received inspiration that significantly influenced his subsequent work with teachers.

Still later, he became deeply interested from many sources in the Modern Art movement, a natural development from the simple, if sometimes rather clumsy, designs of the *Craftsman* movement, of which Elbert Hubbard and Gustav Stickley were prominent exponents.

In all these contacts, as well as in innumerable other experiences, Roberts kept constantly in mind his search for the application of abstract principles of art and design to industrial-arts problems, and ways and means of helping teachers of shopwork and drafting to make these applications to their own work and to that of their pupils.

In concluding the summary of the activities of his first year as supervisor of manual training, 1893–94, Mr. Roberts mentioned three "marked advantages" of the Cleveland public school system which, in his opinion, contributed significantly to the accomplishments of the year: ***First***, the organization of a complete and continuous program of manual training, extending from the primary grades to the high schools, inclusive. ***Second***, a special tax levy making definite provision for this particular branch of schoolwork, thus eliminating financial problems and difficulties which so often beset the introduction and development of a new line of instruction. ***Third***, the policy of appointing special teachers. "As careful training and preparation should be required of manual training teachers as of teachers in any other department of schoolwork. The Cleveland school administration has been unanimous and unyielding in its acceptance of this principle."

High School Shopwork for Girls

In June, 1894, the West Manual Training School, of which Roberts was the first principal, completed its fourth year, with an enrollment of 52 boys and 35 girls. A distinguishing and pioneering feature of this school was the offering of instruction in shopwork and mechanical drafting for girls. Girls were enrolled first in September, 1892, a class of ten from West High School, and the first year's work consisted of light benchwork in wood and wood turning. "The work was looked upon as an experiment and was subjected to considerable discussion and criticism, favorable and otherwise."

Before the close of the year the experiment had fully justified itself, and with the opening of school in September, 1893, a beginning class of 35 girls was organized. The success of this undertaking was such that, beginning in September, 1894, announcement was made of a three-year course of manual training for high-school girls, consisting of light benchwork in wood, mechanical drafting, wood turning, clay modeling, and wood carving.

Administration of Superintendent Elson

Elsewhere reference has been made to the two years of the administration of Dr. Andrew S. Draper as superintendent of the Cleveland schools, 1892–94, as a period of remarkable achievement in reorganization, inspiration, and progress. Passing lightly over the intervening years it is instructive to consider some accomplishments of another noteworthy administration, that of William H. Elson, who was superintendent of the Cleveland schools from September, 1906, to January, 1912. "The advent of Mr. Elson marked the beginning of another era in Cleveland school annals. Few men have been associated with our schools upon whom such extreme judgments have been passed. My own (Roberts) opinion is that he was about eight or ten years ahead of his time. Teachers and the public were not ready to accept ideas which then seemed radical, but which have since become commonplace.

"Up to this time effort in school development had been largely expended in raising standards of teaching, within the limitations of courses and methods that could be applied uniformly to all children. One of the significant contributions of Mr. Elson's administration was the effort to recognize child differences and child needs."

In February, 1905, the board of education appointed an educational commission, and authorized a survey of the Cleveland schools. The report of the survey appeared shortly after Mr. Elson took office, and it fell to his lot to take the initiative in

doing whatever was to be done with the recommendations of the survey commission. Among other major recommendations, "the technical high schools and high schools of commerce were primarily the result of the Cleveland survey; but in reality they were the products of the genius of Mr. Elson."

The survey report emphasized the fact that the traditional courses in the high schools as then organized tended chiefly in the direction of preparation for college and university. By so doing they failed to appeal to the interests and meet the needs of large numbers of children. It was argued that the needed changes in curricula could not readily be made in the traditional schools, and plans were drawn for special schools of quite new and different types.

Curiously enough there was considerable opposition to the proposed new technical high schools from within the school system. It was believed that the new schools "would detract from the dignity of high-school education, and that their establishment would seriously impair attendance at other high schools. As a matter of fact, the first year after East Technical High School was opened the attendance at certain other high schools did drop slightly, but this was due largely to the fact that many advanced pupils who found difficulty in adjusting themselves to the work of the traditional schools were transferred to the new school, and not to a decrease in the numbers entering. The ultimate discovery was that the new schools appealed to an entirely new and added high-school population, not of inferior but of different qualifications."

The Technical High School

The organization of the two new technical high schools was one of the significant achievements of the Cleveland public school system, and in this development Mr. Roberts played an important part. East Tech was opened in 1908, and West Tech in 1910.

Mr. Bennett traces the origin of the technical high school to changes and improvements suggested by experiences with the manual training schools established by Dr. Calvin M. Woodward, Dr. John D. Runkle, and their associates and followers. Following the pathway blazed by the pioneer schools under private auspices, the movement spread rather rapidly in the public schools. "In the ten years from 1883, when the work first began to appear in public high schools, to 1893, manual training was introduced into public high schools in more than 50 cities in the United States. By 1900, this number had more than doubled." (In 1948, the number of industrial-arts teachers in the United States is estimated at 35,000 or more.)

With the spread of the movement throughout the country, and the increase in the number of experimenters, the manual training school idea grew in depth as well as in extent and variety. "As this type of school grew in popularity, there was a constant tendency to enrich the course of instruction so as to serve a larger number of pupils. This meant a wider range of courses, more elective subjects, and a longer school day."

The manual training school appealed more and more to the 80 per cent of boys and girls who could not or did not look forward to further schooling in college or university. Many of these individuals, after a year or more in the manual training high school, discovered unsuspected interests and abilities, and some changed their minds about further schooling.

Just as some academic high schools were persuaded to offer courses in industrial arts and homemaking to hold pupils who did did not expect to go to college, so the manual training school found it advisable to add courses in the languages, the physical, biological, and social sciences, and others, to provide a more rounded education and to make possible a college-preparatory curriculum for at least some of its pupils. The schools that gradually evolved along these lines afforded unusual opportunities for individual children to develop whatever special abilities or interests they might discover.

"The tendency to enrich the curriculum of the manual training school brought about important changes in two directions: (1) toward a complete fusion with the regular or academic high school, which ultimately resulted in what came to be known as the cosmopolitan or comprehensive high school; and (2) toward a richer curriculum on the technical side, resulting in what was called a technical high school, or, in a few cases, a mechanic arts high school, a manual arts high school, or a polytechnic high school, though the latter two terms were sometimes applied, as in California, to schools of the comprehensive type. The technical high school, theoretically at least, is a more specialized school of the manual training high school type. It belongs, therefore, only in a city that has more than one high school."

The Springfield Technical High School

One of the earliest schools supported by public taxation to be designated a technical high school was that in Springfield, Mass., of which Charles F. Warner was the first principal. This school was established as a separate high school in September, 1898, and at first was called the Mechanic Arts High School. Its program and plan were modeled after those of the Mechanic Arts High School in Boston, which was opened in the fall of 1876 as a department of the Massachusetts Institute of Technology, and discontinued in June, 1888. The Springfield school was influenced also by the experience of the Rindge Manual Training School, which opened in Cambridge, Mass., in 1888, established and supported by private funds.

In October, 1898, soon after the opening of the Springfield Mechanic Arts High School, a new public evening trade school was organized in the same building, making use of the same equipment, and employing the same teachers as the day high school. Incidentally, this is said to be the first school in the United States to offer trade training at public expense. The existence together of the public evening trade school and the day high school led to considerable confusion in the public mind, and the purpose of the Mechanic Arts High School was misunderstood at first. "This school was not organized as a trade school, but as a high school in which, besides the academic branches of a full high-school course, the fundamental principles of drawing, of design, and of hand and machine tool work should be taught in a practical way." In order that there might be no further misunderstanding of the purposes of the school, its name was changed, in 1904, to the Technical High School.

"No attempt was made to teach the trades. In the same spirit, courses in domestic science and household arts were offered to girls. The educational aim was broad and practical, not narrowly vocational. In fact, pupils were able to enroll in a college-preparatory curriculum of this school."

Other Early Examples

Other early examples of the technical high school established and maintained at public expense were:

The Stuyvesant High School, New York City, opened in 1904, Dr. Frank H. Rollins, principal.

Cass Technical High School, Detroit, Mich., organized in February, 1907, and later moved into its own building, Benjamin F. Comfort, principal.

Lane Technical High School, Chicago, Ill., moved into its own building in 1908, under the direction of William J. Bogan, principal, who subsequently served as superintendent of the Chicago schools.

In 1912, the William L. Dickinson High School, Jersey City,

N. J., opened an industrial education department which provided the substantial equivalent of a technical high school, under the direction of Frank L. Mathewson, who came from the East Technical High School in Cleveland.

From what has been said it is readily seen that the technical high school, as its advocates always claimed, served a dual function. For some pupils it was a finishing school, preparing more or less directly and completely for entrance upon some specialized vocation. For others it aroused new interests and ambitions and served as an inspiration to further study in some scientific or technical field.

The Comprehensive High School

As indicated, the usefulness, and perhaps even the existence of the technical high school is limited to communities large enough to support two or more high schools. To round out this discussion mention should be made of the contrasting type of high school which seems to be more widely distributed in the United States — the comprehensive or cosmopolitan high school.

The trend in this direction undoubtedly was influenced not only by economic factors but also by the recommendations of the national Commission on the Reorganization of Secondary Education. The epoch-making report of this Commission, entitled *Cardinal Principles of Secondary Education*, was published by the U. S. Office of Education, Bulletin No. 35, 1918. One of the major recommendations was to the effect that "senior high schools and four-year high schools of the older organization should, as a rule, be of the comprehensive type."

The growth, functions, and achievements of the technical high schools in Cleveland, and elsewhere, are worthy of much more extended treatment than can be given them in this sketch.

Growth Under Roberts' Leadership

It is scarcely necessary for me to emphasize that I have not been able to give a comprehensive or adequate account of Mr. Roberts' achievements as supervisor of industrial arts in the Cleveland schools. There is much more that should be told, but I must turn now to other significant phases of his career. I have already pointed out that the industrial-arts program in the Cleveland schools began as a one-teacher enterprise, in 1890, when Mr. Roberts was appointed the first principal of West Manual Training School. This is perhaps an appropriate place at which to record the objective fact that under his dynamic leadership it grew and developed into a program the magnitude of which is suggested by the activities of a staff of close to 350 industrial-arts teachers at the time of his retirement from active service, in 1933.

(To be continued)

Vocational Education for the Nonverbal Learner

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Life in these United States since the turn of the century has become more and more complex with an ever increasing tempo. We have witnessed the evolvement of a material culture which has given us, in rapid fire order, devices such as the automobile, the airplane, and the radio which have changed our whole pattern of living. Briefly reviewing the tragic history of mankind which has been written during the past half century, we find a period of great industrialization followed by economic collapse and the first world war. The following decade was marked by vast changes in social mores, prohibition, a nightmarish and artificial economic era which reached a crescendo with the stock market collapse of 1929. Then followed a period of economic depression that seared men's minds and souls, and initiated vast expansion of governmental responsibility and control. Again a world war, so tremendous in its ramifications that it staggers one's ability to comprehend. The harnessing of the atom to step up the efficiency of destruction rocked our faith to its very foundations. Truly, the confusion of our contemporary civilization challenges the future of mankind. Mass production has given us a technological monster which spews forth social and economic problems which seemingly defy solution.

Within the short span of a man's lifetime, we find a sudden transformation from the "horse and buggy" era to the era of supersonic flight. The gradual disappearance of the versatile craftsman, and the emergence of the operative as a mere cog in our production machine, the change from a predominantly rural to an urban civilization, developments in transportation and communication until our neighbors are all the peoples of the world, the gradual disintegration of the family as our basic social unit, all these and many more pass before us, if we but pause to review the march of events as they are passing by.

Increased Responsibility of Education

Education has been caught in this whirlpool of economic and social crises. It has emerged from a relatively unimportant position in our social order to an institution of tremendous responsibility, increasingly burdened with complex and vexing problems. In this evolving process, education has mumbled and fumbled, attempted to keep pace by erecting glittering structures and issuing superficial catch phrases labeling abortive attempts to solve its problems, yet retaining within its walls the same sterile, static symbols and system.

As our industrial age has evolved, we have witnessed a gradual raising of the entry age into employment for youth. About 15 years ago, the compulsory school attendance age was raised from 14 to 16 years. Significant signs on the horizon point toward raising the school leaving age even higher. This condition has created a great expansion of the secondary school population. Vast numbers of youth who formerly left school for employment at an early age now must remain in school.

Vocational education may well be proud of the many fine contributions which it has made to increase the scope of the secondary school program. Its growth has paralleled the increase in the secondary school population. However, vocational education has, along with its academic predecessor, been handicapped by lack of vision. It is now time to face the challenge of providing education for all the children of all the

people. In a democratic social order, education must play a vital role. Education must provide the foundation for building a future of peace and security. To accomplish this assignment, there will be no room for the conventional program based upon meaningless, arbitrary standards geared to the needs of the theoretical average individual. A new philosophy is needed. Vocational education, with courage and tenacity of purpose, has the opportunity to formulate this philosophy and to put it into action with a program of education, the core of which will be occupational activities. This will be a dynamic, functional, realistic program, based upon objectively determined standards for each individual. No longer can we merely prepare beautiful statements of philosophy and mouth fine phrases concerning what education should do, listen to the appropriate applause, and then complacently go right along in the good old conventional groove.

It is our habit to be vague and indefinite about the fundamental concepts of our social order. Any new philosophy for vocational education must grow out of these concepts. It would seem appropriate, then, to reorient ourselves so that there may be unity of thinking as we consider the development of this philosophy.

Good defines a social order as "any society deliberately established on the basis of and operating in accordance with a consciously conceived plan or theory, as opposed to a society that has developed somewhat haphazardly and that lacks a conscious guiding principle."[1]

Tenets of a Democratic Social Order

As the democratic way of life is the basis of our social order, it is important that we consider a few of the tenets of a democratic social order which are particularly significant to secondary education.

1. A democratic society is dynamic. Movement toward improvement of the social order is the means of survival.

2. A democratic society holds the individual of paramount worth, the state but the instrument of society.

3. A democratic society measures its strength by the extent to which its citizens understand and practice co-operative living and working together.

4. A democratic society emphasizes the duties and responsibilities of its citizens in direct proportion to the rights and freedoms granted.

5. A democratic society embraces the principles of equality of opportunity and keeps the way open for the individual to rise in accordance with his merit.

6. A democratic society presupposes a worthy economic contribution from each of its members; a dynamic society cannot *carry* nonproductive members in any significant numbers.

7. A democratic society depends upon the widest possible enlightenment of all of its citizens since ignorance and fear are inimical to the welfare of this kind of social order.

8. A democratic society depends upon the evolvement of leadership from among the people for an improving social order.

If a social order is to function effectively, the institutions in the social order must conform to the expressed philosophy. Thus education, being an institution, must conform to these basic tenets. That our citizens have recognized the fundamental soundness of these tenets is evidenced by our compulsory school attendance laws. However, the degree to which we, in education, have developed a program to put this philosophy into practice is a very moot question.

We willingly accept such tenents as the individual is of paramount worth and the way is open for the individual to rise in accordance with his merit. The emphasis is on the individual. Personality as defined by Good is "(1) the characteristic patterns of behavior through which the individual adjusts himself to his environment; and (2) the role and status of an individual in society."[2] If we are cognizant of the tenets of a democratic social order and the behavior pattern of the individual is his personality, we must consider all the factors which influence personality including his physical, mental, social, emotional development and educational achievement. Basic to the whole process of the growth of well-adjusted individuals is the satisfaction of success, the feeling of accomplishment, recognition, of being accepted, of stature as an individual.

An Educational Philosophy

An educational philosophy is defined as "any philosophy dealing with or applied to the process of public or private education and used as a basis for the general determination, interpretation, and evaluation of educational objectives, practices, outcomes, needs and materials of study."[3] It is customary to express an educational philosophy in the form of objectives which may be defined as "(1) a standard or goal to be achieved by the pupil when the work in the school activity or school division is completed; (2) the end toward which a school sponsored activity is directed; (3) a desired change in the behavior of a pupil

[1]Carter V. Good, Dictionary of Education (New York: McGraw-Hill, 1945), p. 377.

[2]Carter V. Good, *op. cit.*, p. 293.
[3]Carter V. Good, *op. cit.*, p. 295.

Three eighth graders at Roosevelt Junior High School, Elizabeth, N.J., start drawing their preliminary sketches for a model car, following specifications outlined in the Fisher Body Craftsman's Guild plans manual. They are (left to right) Don Paskovich, Warren Roman, and Frank Sobozenski

as a result of experience directed by the school."[4]

In our programs of vocational education to date, with few exceptions, we have been content to merely institute a new area of instructional material, yet it is still restricted by the conventional system and symbols. We have failed to recognize that all boys and girls do not have the capacities necessary for rigid, formalized patterns of study, that vocational education is not limited to the acquisition of highly developed skills, that the great majority of our occupations in an industrial society are of the operative or lesser skill classification. Vocational education is particularly qualified to meet the challenge of providing a program for all youth so that each individual may progress through his school career with a merited feeling of satisfaction.

To meet this challenge necessitates the acceptance of a new philosophy which might well be expresesd in objectives such as the following:

The program of vocational education should offer each student:

1. The opportunity to participate in meaningful educative experiences commensurate with the individual student's needs, abilities, aptitudes, and interests.

2. The opportunity to study to the maximum of the individual's capacity.

3. The opportunity to be recognized as an individual and not subjected to mass instruction designed for the average individual.

4. The opportunity to participate effectively in co-operative procedures and to associate in a democratic atmosphere with his co-workers as a peer, follower, and leader.

Such a program need not be merely a vision. There are certain guideposts which point the way toward accomplishing these objectives:

1. The school day must be lengthened to at least 6 clock hours, required homework and study halls abolished, and controlled study introduced.

2. The barren, regimented, uninviting classroom and shop must be abolished and a colorful, functional study and work laboratory introduced.

3. The curriculum must be extremely flexible with a minimum of mandates. The diversity and practicability of the so-called academic and related subjects must be increased.

4. The curriculum materials must be within the range of the capacities of the nonverbal learner. The planned use of audio-visual aids must be expanded.

5. The opportunities for occupational training must be broadened by utilizing the resources of the community on a co-operative basis. There are many youth whose capacities preclude any intensive training in the development of skills and/or technical knowledge, but who will profit considerably from a program based upon occupational activity within their ability and which will enable them to develop acceptable work attitudes and habits. Because of many limitations, it is impossible for the school to offer the type of occupational training which will enable these youth to develop all these desirable characteristics.

6. The guidance services must be expanded to assist each individual to determine what is the most advantageous program for him, to assist the individual to progress in the program elected, and to provide adequate placement and follow-up services.

7. In many courses, both in school and in co-operative programs, it will be desirable, if not actually necessary to compensate the students.

8. Short unit courses must be developed as the need arises in specific occupational areas in the community. This type of training should not be limited to enrolled students, but should be a continuing service to "out-of-school" youth.

9. Arbitrary mass standards must be abolished and standards based upon the interests, abilities, aptitudes, and initiative of the individual introduced. The conventional diploma should be discarded and a summary rating form introduced.

10. Progress should be based upon social maturity, that is, growth as an individual, physical, mental, and emotional.

It is recognized that this philosophy and the steps necessary to put it into practice require a radical departure from the status quo. It will require pioneering, imagination, long and careful planning, and a firm belief in the basic tenets of our democratic social order. It is not the easy way. However, if we have the courage to face the challenging problems of our contemporary society, we cannot evade the task.

[4]Carter V. Good, *op. cit.*, p. 278.

Plastics in the Industrial-Arts Shop

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There may be indecision on the part of some school people regarding the advisability of including instruction in such materials as plastics in the school shop course of study. However, if the objectives of an industrial-arts program are reviewed, one can readily see that in order to explore industry no industrial-arts course would be complete without a study of plastics. To quote one statement of accepted objectives for industrial-arts education we find that such training should "develop in the student a knowledge and appreciation of industry and industrial life; provide experiences which can be used by the student in leisure time and avocational pursuits; develop the student's ability to select wisely, buy intelligently, and properly care for the industrial products he buys and uses; and develop the student's ability to express himself creatively, using the tools and materials of industry.[1] These are only a few objectives of a functioning industrial-arts program, but they are objectives which can be attained very satisfactorily, in part at least, through a study of the comparatively new material of industry — modern plastics. Plastic is one of the materials of industry today which has risen in importance at a very phenomenal rate of speed, having gone through a meteoric rise since 1930. Inasmuch as this material is used in so many different ways, it is important for our students to be acquainted with the various types of plastics which are used, to know something about the raw materials which go into their manufacture, and to become acquainted with the methods of fabrication of the material and its industrial uses. One manufacturing company claims more than 25,000 uses for its plastic products, which indicates that plastics today are

[1]*Industrial Arts in Utah*, Part I, Handbook, p. 12. State Department of Public Instruction, Division of Industrial Education, Salt Lake City, Utah.

used very widely and are novel because of their exceptional beauty and versatility. In the industrial-arts field no other material lends itself more to the study of industry and its products. It is new and ever changing, and its use in our modern life has expanded our concepts of material beauty, durability, and ease of fabrication.

Students who learn to work with plastics often work with this material as a part of their hobby program. Since it is easy to work, and since few special tools are necessary in working with it, almost any boy or girl, if he or she desires, can acquire the necessary equipment for making plastic projects at home. Many suppliers of plastic materials have recognized this fact, and today one may purchase many types and sizes of plastic craft *kits*, some of which are semiprefabricated for the convenience of the purchaser.

The study of plastics is certain to result in increased *consumer knowledge* on the part of the student. Today many articles, which a few years ago could only be made of heavy metal or fragile glass, are made of one or more of the plastics, which are neither heavy nor fragile, and which are unique in their color and other physical properties. The shelves of our hardware and general merchandise stores are stocked with almost innumerable plastic products, and grocery stores are daily selling many food products in containers that are partially or entirely made of plastics. The industrial-arts plastics course, if properly taught, will acquaint the students with these many applications of this important industrial material, and will result in giving our growing American population a greater understanding of, and appreciation for, the world in which we live.

Work in plastics can easily be adopted in the majority of our industrial-arts shops. Anyone who has worked with the material will realize that very few pieces of equipment and very few tools are necessary in addition to those machines and tools used for the ordinary woodwork and metalwork programs. Many of the ordinary hand tools are very well adapted to the working of plastics. Plastics can be cut with coping saws, jig saws, band saws, and in some cases, circular saws. Practically all plastic materials can be turned on the lathe, machined on the routers or drill presses that are converted for that purpose, and can be drilled and tapped for machine screws or other threaded fastenings. In most school woodwork shops, or general shops, the only additional equipment which will be necessary is a buffing head for the polishing of the material. This buffing equipment is very inexpensive and in many cases can be made at home with salvaged materials.

The average industrial-arts teacher is always alert for ideas which will make his work easier and more effective. The inclusion of a unit on *plastics* in his shop course of study is such an idea, for the students are naturally attracted by the material and little encouragement is necessary to keep them busily engaged in making projects of plastics. The operations involved in the fabrication of plastics — sawing, filing, drilling, sanding, buffing, etc. — are comparatively simple, and little study on the part of the instructor is necessary in learning to perform these operations. The major portion of the time needed by the instructor will be spent in studying the industrial background material, and in preparing such information for presentation to his students. The development of original project plans will also be a *spare-time activity* for the shop teacher.

Both boys and girls enjoy and can profit by shopwork where plastics are used. The color and natural sparkle of the material makes it almost impossible to create projects which are not attractive to the eye, provided certain fundamental rules of design are observed. Such projects as dress clips, buttons, purse handles, compacts, powder boxes, and other knickknacks which emphasize and add to the beauty of wearing apparel can be made easily, and therefore girls are easily attracted to working with plastics. In making plastic projects, both girls and boys will learn fundamental tool processes which will prove very valuable to them in making minor repairs around the home and in making it possible for them to exercise their creative ability. This is but another reason for including work in plastics in the school shop — it will have a natural attraction to the girls of the school, who, according to modern philosophy of industrial arts, should take advantage of the mechanical training which is offered in the school shop.

A wealth of books on the subject of plastics, and project plans varying from the simple to the complex, are available for the teacher or craftsman who desires to work with plastics. It is also interesting to know that there are periodical magazines available which are devoted entirely to plastics, and even the most casual reader will occasionally see and read articles dealing with plastics and their fabrication in some of the more popular weekly and monthly magazines.

History of Plastics

While the use of certain plastic materials dates back almost beyond our written history, the first methodical study of plastics as such was completed in 1869 when John Wesley Hyatt, a young American printer, developed a plastic which was chemically a mixture of cellulose nitrate and camphor. This cellulose nitrate was formed by the action of nitric acid on cotton cellulose. These two chemicals were subjected to heat and pressure and the result was the first shop-made plastic, celluloid. The discovery of this plastic was the result of a contest sponsored by a manufacturer of billiard balls who had offered a $10,000 prize to anyone who could develop a material which would be a satisfactory substitute for ivory, out of which billiard balls were made at that time.

The next important step in the development of plastics came in the late 1800's, when a German scientist, Adolph Spitteler, mixed sour milk with formaldehyde and produced a form of casein plastic. Then in 1909 an American, Dr. Leo Hendrik Baekeland, mixed phenol and formaldehyde and produced a synthetic resin which was given the trade name of Bakelite, a plastic which is still one of the most popular of all.

After the production of the Bakelite plastic began, the foundation for the plastic industry had been laid. Production has increased phenomenally since that time and as a result of the great amount of research which has been done, we now have many new types of plastics and many methods of fabrication which have greatly expanded the usefulness of the material. At the present time plastics may be obtained in practically any shade or hue which one can desire, and because of this fact, together with its ease of fabrication, plastics are fast becoming one of the most widely used industrial materials in America. During the recent war, the armed forces have made extensive use of plastics in thousands of ways, and during the year 1944, a total of over 700,000,000 pounds of plastics was produced. This figure does not include 400,000,000 pounds of styrene resins, important in the manufacture of synthetic rubber. Plexiglas and Lucite, the *acrylic resins*, have proved invaluable for the construction of gun turrets, windows and windshields, and many other parts for military aircraft. These acrylic resins, incidentally, constitute one of the most satisfactory plastics for school shop work.

(To be continued)

William George Bruce Dies at 93

Saturday, August 13, 1949, was a bright glorious day filled with sunshine, but for the employees of The Bruce Publishing Company there was only gloom and sadness, for William George Bruce, their aged chief, their Grand Old Man, the president and founder of The Bruce Publishing Company, and Milwaukee's Citizen No. 1, had died during the night.

True, we all knew that William George, as he was affectionately known at the office, was very low, that his weakened condition did not permit him to fight the attack of pneumonia with which he was afflicted, with his usual stamina, but we still hoped that he would recuperate as he had done so many times before. To us at Bruce's, William George belonged to the immortals who would lead us on forever.

Sick as he was, he never lost his sense of humor, and he always had the kindest messages for those who sent inquiries about his condition.

He was born in Milwaukee on March 17, 1856. As a youngster of seven he was afflicted with a hip disease which confined him to his home for four years. Much of his education was obtained during this time under the guidance of his loving mother. While he recovered from the affliction sufficiently to be up and around, yet it left him with a limp during the rest of his life.

At the age of twelve William George had to go to work. Being delicate, a sitting job was selected for him and he became a cigar maker. At the age of eighteen he was rated as expert as the older men in the shop where he was employed, and received top wages — fourteen dollars per week. He felt that a job of this kind did not offer much of a future and started out on a business course at a commercial college in Milwaukee. Having finished his course, he took a job at the old *Milwaukee News* at much reduced pay, because that job seemed to him to offer a chance for advancement. And it did offer him that chance, because he eventually became assistant business manager with an opportunity to do occasional reporting and editorial writing.

William George Bruce

In 1889 he was elected to the Milwaukee School Board, and since he could find neither books nor magazines which could tell him anything about the duties of a school board member, he left his job at the newspaper office and started the *American School Board Journal* in 1891. That was the beginning of The Bruce Publishing Company.

Singlehanded he took care of the editorial work on his new magazine, sold the advertising, and solicited subscriptions. By dint of perseverance the venture grew until his sons, William C. Bruce and Frank M. Bruce, were old enough to assist him in the business. Then the firm grew, until now it publishes four different magazines and several types of books.

Mr. Bruce always had a strong sense of his civic responsibility, and gave freely of his time and energy to help along worth-while undertakings. He was an energetic leader and promoter for a greater harbor for Milwaukee and the Great Lakes waterway. He was also a member of the Milwaukee Auditorium board since its very inception, and was its president from May, 1936, until his death.

Mr. Bruce also was one of the founders of the Milwaukee Association of Commerce. He was the first member appointed to the Milwaukee Harbor Commission when it was organized in 1912, and has been its president since 1921. He also was one of the organizers of the St. Lawrence Tidewater Association. In 1936 he was elected vice-chairman of the National Seaway Council and was a member of the International Joint Commission of the United States and Canada on the St. Lawrence River project. For eight years he was the president of the Great Lakes Harbors Association of the United States and Canada.

He was one of the three members of the Wisconsin Deep Waterways Commission and was appointed to this post by the governor of Wisconsin.

He also found time to do considerable writing. "The History of Milwaukee," "Bruce's School Architecture," "Manual of School Administration," "Commercial Organizations — Scope and Function," "The Commercial Secretary," and a condensed "History of Milwaukee," are the names of some of the books that he wrote.

Mr. Bruce was an ardent Catholic and was made a Knight of St. Gregory by Pope Benedict XV in 1921. In 1939 Mount Mary College, Milwaukee, Wis., conferred on him an honorary Ph.D. degree. In 1947 he received the Vercelli medal for outstanding Catholic service, and the University of Notre Dame awarded him the Laetare medal in the same year.

Other honors conferred on this Grand Old Man are the following:

In 1935 the Cosmopolitan Club of Milwaukee gave him the distinguished service medal.

In 1944 he was named the "Man of the Month" by the Milwaukee Advertising Club.

In 1948 the Milwaukee Eagles granted him the outstanding service award.

The main hall of the Milwaukee Auditorium was named the William George Bruce Hall in his honor in June, 1949.

He was a member of the Milwaukee Athletic Club, the Old Settlers' Club, the City Club, and chairman of the board of directors of the American State Bank.

The day of the funeral gave ample proof that this slight little man with the friendly smile and affable manner was a friend of thousands. The church was too small to accommodate the hundreds who wanted to attend the funeral mass, and the cortege to the cemetery was sheer endless. State, county, and city officials were there, also hundreds from the humbler walks of life, who knew and loved him for what he had done during his long life.

William George has gone, but his memory will long remain with us. He will always be remembered for his willingness to help the other fellow, for the clearness of his thinking, and for the modesty with which he took the honors that were bestowed upon him. People found it just impossible not to honor a man who was so ready to do what had to be done in such a wholehearted, unobtrusive manner.

Make Related Mathematics Related

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The vocational student sometimes asks, "What do I have to study this geometry for anyway? I'm never going to use it on my job."

Is there really a bona fide reason why the formalized courses should affect vocational school offerings?

It is often said that if the basic mathematical fundamentals are given the student, he will apply these general principles to the trade problems that he will meet on his job. True, the more intelligent students will be able to make some transfer from the abstract to the concrete situation by making a definite conscious effort, but the average pupil will not be able to make much, if any, transfer.

Teachers of mathematics find it rather difficult to make applications to the various trades is spite of their huge reservoir of formal mathematics. If the teacher with a little trade information and a large knowledge of mathematics has trouble finding practical applications, how much harder it is for the pupil who has little trade information and also little mathematical background to make such applications!

Either the related teacher must learn more of the trade to supplement his mathematical knowledge, or else the student must be given an education in mathematics that compares in a measure to that of his teacher if he is going to use calculations in his work to any appreciable extent. It is, of course, practical for the teacher to learn enough of the trade to determine where and how mathematics can be useful in the trade, than by having the pupil try to learn a lot of excess mathematics and then try to apply a small portion of this half-learned knowledge to his job. The initiative must be taken by the teacher; it will not be taken by each pupil in each class.

In order to find out what mathematics is applicable to a certain trade and to present it in a trade situation, the related mathematics teacher must work very closely with trade blueprints, trade books, actual shop jobs, and with a skilled mechanic in the trade. He must assemble his trade knowledge from these several sources, sort out the problems in the trade where mathematics may be used advantageously, and then organize this information into a psychological teaching sequence.

The related teacher should start with the problems of the trade and go from there to the mathematics needed, and not the reverse. He should list every important job that might be encountered in the trade and analyze it to see what calculations must be understood by a good mechanic or supervisor. Then he must analyze each of these calculations to see where it might fit into the related mathematics course. He must keep in mind that mathematics is just another tool to be used in planning and executing a job in the trade. He must evaluate the worth of each topic in mathematics.

It is imperative that the teacher learn something of each trade that he contacts so that his course will not conflict with that of the shop instructor. He must use the terminology of the trade where it affects the topics that he is teaching. He must present normal trade problems so that pupils will not feel that the course is not merely an academic course with a vocational title only. He must be careful not to use *fake* problems that would not appear in the trade. He must condense and clarify mathematical definitions to make them really usable.

It is, of course, essential that training in the fundamentals of mathematics be taught well. They should be given a trade setting; even drill work should be presented by means of trade problems. Since not many problems arise in the school shop, a plentiful supply must be made up by the mathematics teacher. The number of mistakes that pupils make when working bare drill problems in the fundamentals of arithmetic is reduced greatly when the motivation of *genuine* shop problems is provided. The pupil is more careful in his work when he can see the usefulness of it; he will continue to be careless when facing nothing but monotonous drill work.

The sequence of topics in the mathematics classroom should theoretically be arranged in such a way that each is studied when it is presented in the shopwork. Although this arrangement is an ideal, much can be done in a practical way to keep classroom work and shopwork running parallel. For example, when the machine-shop pupil is learning to turn a taper in the shop, he should be making calculations for taper turning in the mathematics classroom. Naturally some readjustment is necessary at some places in order to maintain a reasonable, but not traditional, mathematical sequence.

Some shopwork does not require any calculations. Opportunity is thus given the related mathematics teacher to teach the general principles, background knowledge, and social mathematics so necessary to a well-rounded course. Formulas must be transposed before needed trade calculations can be made. The unit on transposition of formulas can be taught when the shopwork at the moment does not require any mathematics. At other times when gaps occur, the unrelated mathematics so necessary for the solving of social problems may be arranged according to the best teaching order.

The greatest motivation is secured when a topic is taught just when that knowledge is needed. If this principle is to be taken advantage of, the formal arrangements as found in academic books must be broken up. As an example of this, the turning of tapers may require the use of the tangent table, the use of the sine bar may require the use of the sine of the angle, and complicated layout and difficult setups may require the use of a great deal of trigonometry. Even though layout trigonometry is not taught near the beginning of the course, there is no reason why tangent calculations cannot be taught when needed, and why sine calculations cannot be taught when they are needed, and the balance of useful trigonometry taught later on when a need or an opportunity arises. If the trigonometry necessary for taper turning can be taught in a half-hour, there is no reason for teaching the entire trigonometry book at a time when other topics would fit in with the shopwork schedule.

In other words, trigonometry is not to be considered a subject to be studied, but rather, a tool that may be used on specific jobs. Every use of a tool need not be

learned when the job at hand requires only one specific use. When another use is required, the tool can be demonstrated again to show that particular use. It is not necessary to take an entire course in trigonometry in order to use what is needed on a particular type of practical problem. And so it is with other topics.

The teaching of related mathematics resolves itself into a critical observation of actual needs as found by an intensive study of the trade, and then the development of a teachable course with problems and applications definitely related to the trade. The criterion to be used when judging topics to be included in the course is whether or not each topic, as taught, will actually contribute to the students' mathematical lives in the years to come. When that is done, the teacher will have ready at all times an acceptable answer to the pupils' ever present legitimate question, "What do we have to study this for?" And because he is sold on the validity of the course, the teacher will be able to answer these questioners with a satisfying explanation and with a clear conscience.

Problems and Projects

TOY ELECTRIC MOTOR AND COUNTERSHAFT

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The construction of an electric motor in school shops is an exceedingly worth-while project. The motor shown by Figure 1 is simple to construct. No special equipment or tools are needed, the material required is easily obtainable, the cost is low, and the motor is remarkably powerful. It may be run on an 8 to 12-volt transformer or the equivalent voltage in dry cells. The motor uses carbon brushes held in simple brush holder. The construction of the countershaft mounted on the motor base illustrates vividly to the boy how power of a prime mover can be multiplied by means of pulleys. The belt groove in the small pulley and the large pulley on the countershaft are equal distances from the ends of the countershaft and the countershaft can be almost instantly reversed so that the motor will drive either the large or small pulley on this shaft. Schools lacking adequate drilling equipment may punch all of the holes with a flat punch held on the end grain of a block of wood or a tinner's hand punch may be used to punch the holes.

Either the laminated field and armature construction may be used using tin can material for the construction, with all holes punched, or mild steel may be used for the field and armature. The laminated construction will produce a motor which will have more power and the tendency to overheat will be very much lessened. The use of a laminated armature with a mild steel solid field will give better performance than a solid steel armature and at the same time eliminate the drilling of a hole through steel ⅜ in. thick.

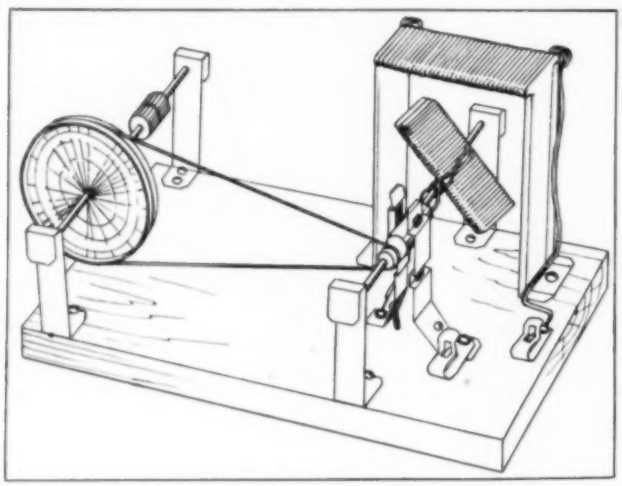

Fig. 1. Electric motor with line shaft

Method of Construction — Base

It is well to begin construction of the motor by making the base first. Pine or basswood will do. Then as the various parts are made they may be fastened in place thus reducing the chance of losing parts. Boys also like to assemble the work as it progresses and to get moving parts moving, even if turned by hand. This also allows plenty of time for adjustment of the various parts.

Each boy should be required to keep his motor and the parts under construction in a box with the cover tied on to prevent loss of parts. A box about the size of a shoe box is excellent. A shellac finish so that the base will not catch dirt, or merely a stain finish so that soil will not be so readily visible, will finish the base very appropriately. Of course, black enamel or paint could be used.

Bearings

The bearings may be made of 20 or 22 ga. ¾-in. box strapping or equivalent material. Box strapping is very convenient to use. It is available in rolls and the thin gauge used permits snipping to length. The holes for the screws and the shaft holes may be punched with a flat punch on the end grain of a block of wood or they may be made with a tinner's hand punch. Figure 2 shows the details of the bearings. Steps 1, 2, and 3, in Figure 2, show how the bearings may be easily and accurately shaped. Be sure that the holes for the shaft are large enough to permit the shaft to turn freely. When the bearings are completed, fasten them to the wood base with No. 4 by ⅝-in. roundhead blued screws. If a 5/32-in. drill is used for the bearings the hole may be enlarged slightly by running the drill through the hole and tilting the work slightly. This should not be done with a power-driven drill press with the work held in the hand. Figure 3 shows the location of the bearings on the base.

Next cut the drill rod shafts to length and file or grind the sharp edge off the ends. Slip the shafts into the bearings by springing the bearings apart. If the shafts do not turn freely after assembly, even though the holes are the proper size, the bearings are out of line and pinch the shaft. They may be aligned by twisting the bearings with the fingers or with pliers.

Laminated Armature

The laminated armature is constructed of ten pieces of tin cut from a tin can. See *1A* and *1B* in Figure 4. One can 3⅜ in. in diameter will provide sufficient material. A can with an enameled finish inside or outside is better than a bright can. The enamel prevents eddy currents and hysteresis. This could be prevented also by shellacking the laminations made of ordinary tin. Scribe a line down the center of the two 1½ by 2½-in. pieces of tin, one of which is shown at *1A* in Figure 4, and with dividers locate the center on the center line. Pierce the tin lightly with the dividers at the center and then form each of

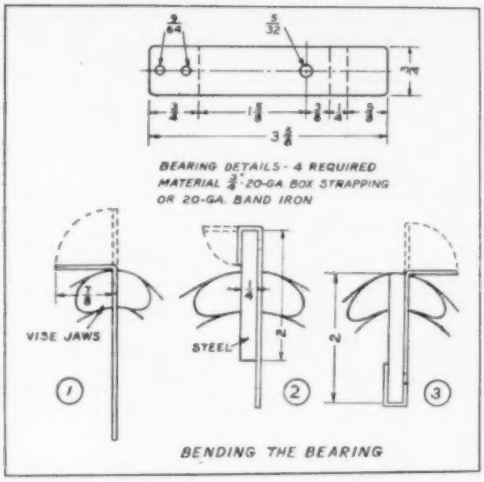

Fig. 2. Making the bearings

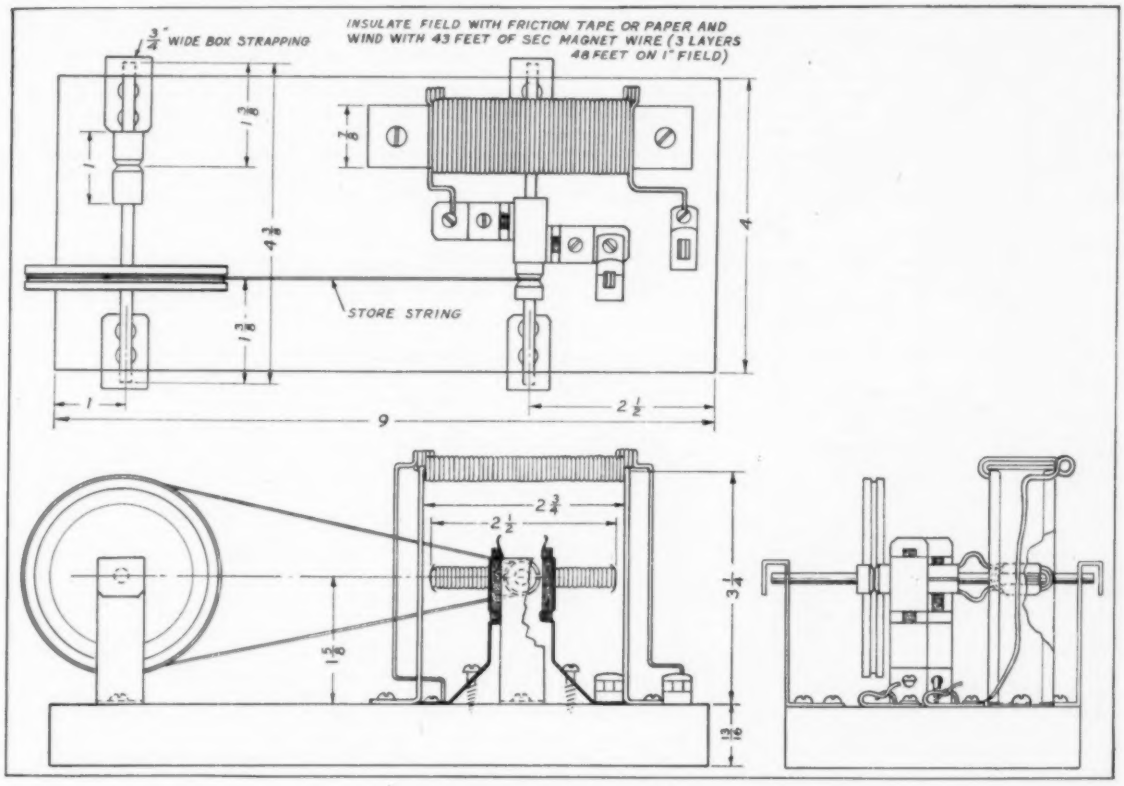

Fig. 3. The motor assembly

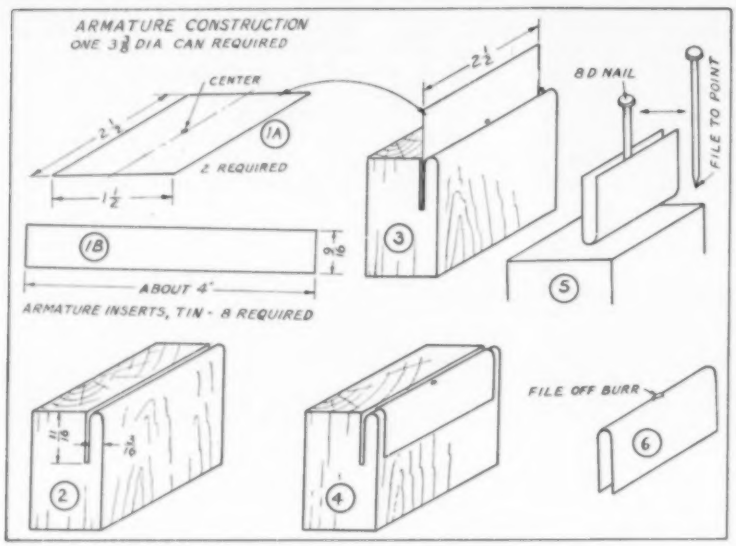

Fig. 4. Jig for forming the armature

these two pieces as shown at 3 and 4, in Figure 4. Do the forming so that the enameled surfaces are inside. At 2, in Figure 4, are shown the details of the jig. At 5, in Figure 4, is shown how the hole is made for the shaft. When the point of the nail clicks into the pierced center produced with the dividers strike the nail with a hammer to make the hole. Then file off the resultant burr as shown at 6 in Figure 4. Next slip the two U-shaped pieces of tin over the shaft as shown in Figure 5. Then slip four of the 9/16 by 4-in. pieces of tin on each side of the shaft as shown. Arrange the pieces so that an enameled surface faces a bright surface. The last insert will have an enameled surface facing an enameled surface of the U-shaped piece. This is O.K. Separating the laminations in this way with enamel prevents eddy currents and hysteresis which waste power and produce heat.

At 1 in Figure 6 are shown the details of a jig used to press the laminations together. How to use this jig is shown at 2 in Figure 6. At 3 is shown a similar jig for holding the laminations while soldering. The tin-can stock in this jig is nailed to the wood blocks. The wood blocks do not conduct the heat from the soldering iron. Solder the armature 5/8 in. in from the end of the shaft. Next bend the outside laminations as shown at 4 in Figure 6. Then cut off as indicated. Be sure to remove the sharp corners from the bent-over laminations with tin snips. Then file them and rub with emery cloth to remove all sharpness. This motor has considerable power and sharp corners might clip the fingers. Next cut the rest of the laminations to length as shown at 5 in Figure 6. Be careful not to cut into the bent outside laminations.

Winding the Armature

Insulate the armature with friction tape or paper. Paper is preferable because it lies flat and results in a neater job of winding. One layer of paper is sufficient. Wind with 20 ft. of S E C Magnet Wire. Mark the center of the wire. Leave about 3 in. for a lead and wind this around the shaft. Then beginning at the shaft wind to the end of the armature. Wind the second layer from the end of the armature toward the shaft until the center of the wire is reached. Next cross over the shaft to the other side of the armature. Repeat the winding on this side of the armature in the same way, being careful to wind both sides of the armature in the same direction. When the winding is finished have both ends of the wire wound around the shaft a couple of turns leaving the two leads free to solder to the commutator bars. When winding the armature clamp one end of the wire in a vise and revolve the armature in the hands keeping

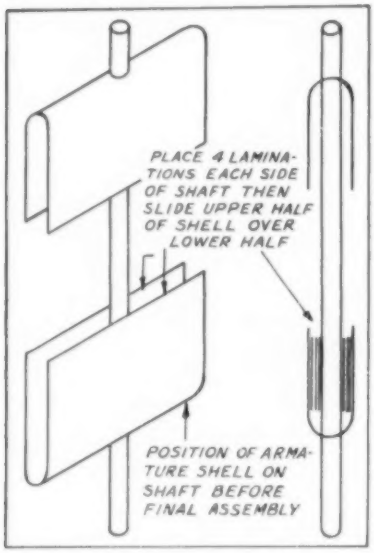
PLACE 4 LAMINATIONS EACH SIDE OF SHAFT THEN SLIDE UPPER HALF OF SHELL OVER LOWER HALF
POSITION OF ARMATURE SHELL ON SHAFT BEFORE FINAL ASSEMBLY

Fig. 5. The armature shell

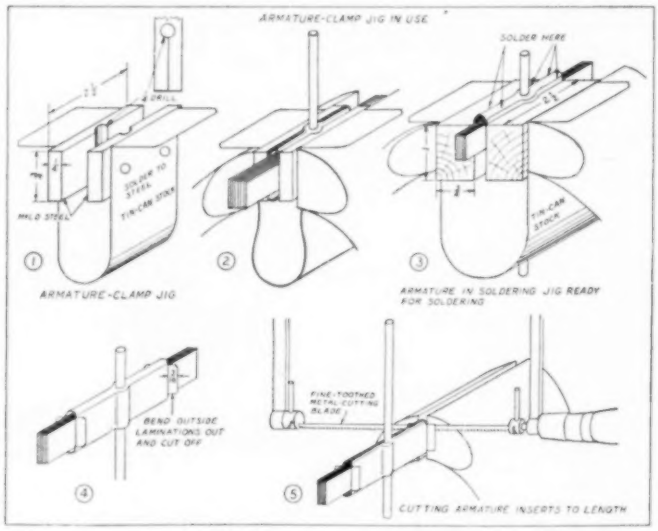
ARMATURE-CLAMP JIG IN USE
SOLDER HERE
ARMATURE-CLAMP JIG
ARMATURE IN SOLDERING JIG READY FOR SOLDERING
BEND OUTSIDE LAMINATIONS OUT AND CUT OFF
CUTTING ARMATURE INSERTS TO LENGTH

Fig. 6. Armature-clamp jig

the wire taut while winding. When the winding is finished give it a couple of liberal coats of shellac to bind it together so that it will not be thrown off by the centrifugal force as the armature revolves.

Solid Steel Armature

The solid steel armature is drilled for the shaft and the shaft is held in place by center-punching the armature directly over the shaft from both sides. The winding is the same as for the laminated armature except that about 17 ft. of wire is required instead of 20 ft.

Commutator

The commutator core is a piece of rubber tubing slipped tightly over the shaft. The rubber tubing should be ⅜-in. O.D., ⅛-in. I. D. with corrugated or ribbed surface. This tubing may be obtained at small cost from shops which retire coaster wagons, baby walker-strollers, and tricycles. Cut the tubing to 1¼-in. length and slip over shaft so that it occupies the position shown in Figure 7. The commutator is made from half hard brass tubing, ½-in. O.D., .402 I.D. wall thickness .049. Cut the tubing to length as shown in Figure 8. At 1 in Figure 9 is shown a jig and its use in cutting the slots into which the armature leads are soldered. The same jig is used to mark with the saw the points at which the tubing is to be cut into equal segments. Cut the tubing into two segments as shown at 2 in Figure 9. First cut through one side of the tube, then turn it over and cut through the opposite side, using the saw cut marks, *A* shown at 1 in Figure 9, as starting points for the cuts. Draw a line across the tube as a guide in sawing. Rub the sawed edges of the segments over a hand smooth file and remove the sharp corners slightly. Another method of cutting the armature lead slots is shown at 3, in Figure 9.

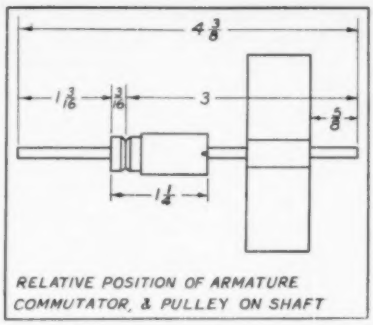

Fig. 7. Mounting the armature, commutator, and pulley

Place the commutator segments over the tubing and try for fit. The space between the segments should equal the width of the saw cut. This can be judged by comparison with the armature lead saw cuts. It may be necessary to file or sand the ribs or corrugations partly off to get the proper spacing. If the rubber tubing is too small due to too much sanding wind a layer of paper around before putting the segments in position for a trial fit. File a belt groove in the pulley where shown in Figure 7. When the commutator bars fit properly solder the armature leads in the slots provided for them, one lead in each slot. Now apply glue to the rubber and to the paper, too, if paper was used. Place the segments in position and clamp with wire as shown by Figure 10. Twist the wire with pliers until the space between the segments is exactly right. When the spacing appears correct caliper the tube across the slots and at right angles to the slots. Tighten the wire until the commutator calipers true. If the slots are of unequal width insert a knife blade into the narrow one and twist the blade. This will widen that slot and narrow the other, thus equalizing them. Be sure that the slots line up with the poles of the armature. Apply glue to all exposed parts of the rubber to keep air from the rubber and to prevent oil from creeping along the shaft and softening the rubber. When the glue is thoroughly dry wash off any glue from the commutator bars

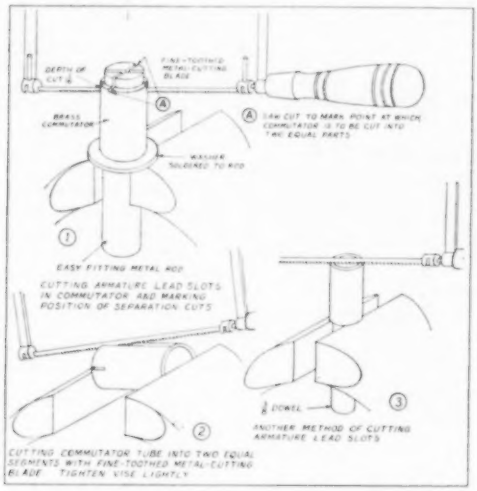
DEPTH OF CUT ¼
FINE-TOOTHED METAL-CUTTING BLADE
BRASS COMMUTATOR
A
A
SAW CUT TO MARK POINT AT WHICH COMMUTATOR IS TO BE CUT INTO TWO EQUAL PARTS
WASHER SOLDERED TO ROD
1
EASY FITTING METAL ROD
CUTTING ARMATURE LEAD SLOTS IN COMMUTATOR AND MARKING POSITION OF SEPARATION CUTS
⅛ DOWEL
3
ANOTHER METHOD OF CUTTING ARMATURE LEAD SLOTS
2
CUTTING COMMUTATOR TUBE INTO TWO EQUAL SEGMENTS WITH FINE-TOOTHED METAL-CUTTING BLADE. TIGHTEN VISE LIGHTLY

Fig. 9. Making the armature

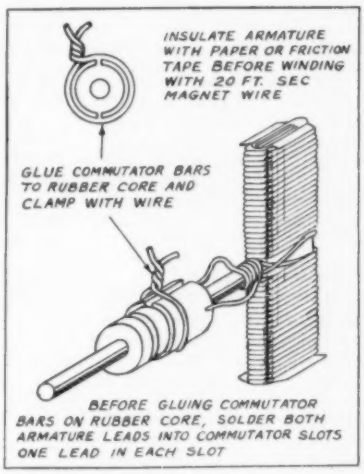
INSULATE ARMATURE WITH PAPER OR FRICTION TAPE BEFORE WINDING WITH 20 FT. SEC MAGNET WIRE
GLUE COMMUTATOR BARS TO RUBBER CORE AND CLAMP WITH WIRE
BEFORE GLUING COMMUTATOR BARS ON RUBBER CORE, SOLDER BOTH ARMATURE LEADS INTO COMMUTATOR SLOTS ONE LEAD IN EACH SLOT

Fig. 10. Armature and commutator

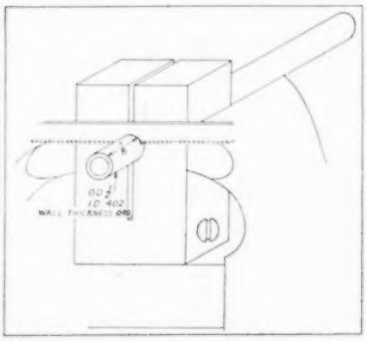

Fig. 8. Cutting brass tubing to length

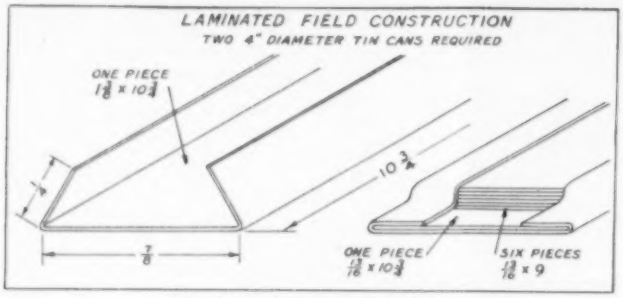

Fig. 11. The laminated field

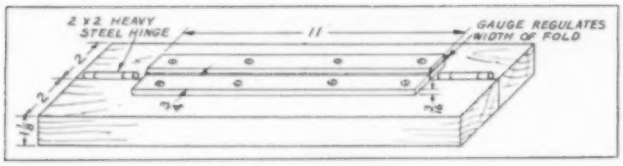

Fig. 12. Bending jig

with a damp cloth. Run a fine-toothed coping-saw blade through the slots to undercut them slightly. A broken blade is good for this job because it can be drawn through the slot. Place the armature in a hand drill and polish the commutator with fine sandpaper. Run the coping-saw blade through the slots again to remove any brass dust which might short the segments.

Laminated Field

The laminated field which can be constructed from material taken from two 4-in. diameter tin cans is built up as shown in Figure 11. Enameled cans are best; they prevent eddy currents which waste power and produce heat. The roofing folder shown in Figure 12 is a great convenience in forming the channel piece. Such a folder is very useful in the shop and worth the time spent in constructing it. The bending or shaping of the field is shown in Figure 13. Lay out the top bends as shown at 2 in Figure 13. Then proceed to bend the field to shape as shown in steps 3, 4, 5, and 6 in Figure 13.

Winding the Field

Insulate the field with friction tape or paper. Paper is preferable; it makes a neater winding job because of the uniform surface of the paper. One layer of paper is sufficient. Wind the field with 43 ft. of SEC magnet wire, three layers. Leave about 6 in. of wire for leads. Clamp one end of the wire in a vise and turn the field while winding. Do not turn the wire as you would a piece of string. This would result in tangled wire. Keep the wire taut while winding. If the shop is not long enough to stretch the full length of wire clamp it near the middle and when this much is wound clamp the end of the wire and finish the winding. The field, too, may be wound in any direction. Wind three or four turns of wire around a pencil at the ends of the wire to prevent accidental breakage of the wire in rough handling. Shellac the winding to bind it together.

Solid Mild Steel Field

Follow the same directions in shaping the mild steel field as for shaping the laminated field. The winding is the same as for the laminated field. Wind the 1-in. solid mild steel field with 48 ft. of wire.

Brushes

The details of the brush holders are shown at 1 in Figure 14. The 3/16-in. square hole in the holders can be punched with a flat punch as shown at 2 in Figure 14. A template such as shown at 3 in Figure 14 should be used to space the holes accurately. This spacing is the only critical dimension on the brush holder. At 4 in Figure 14 is shown the first bend in the shaping process, and at 5, the second bend. At 6 in Figure 14 is shown an important step, and the operation shown at 7 is performed by merely pressing the material over with the fingers. At 8 and 9, Figure 14, are shown two more simple operations. The next step is to form right-angle bends with pliers at all of the six bends just made. The detail at 1 in Figure 14 shows exactly where the bends are to be made, and where all holes should be located. Detail 10, Figure 14, shows all of the bends clearly and also their function in holding the carbon brush. Notice the slight spring bent in the upper part of the holder. This prevents the brush from being thrown from the holder by the rotating commutator. The 1 5/8-in. dimension is not critical because, if it is made more or less, contact will still be made at the correct point on the commutator. The height of the brush can also be raised or lowered by varying the degree of bend at the last two bends. This can be done at any time even after the motor has been in use.

The square holes in the brush holders can be made with a sheet-metal worker's hand punch fitted with a square punch and die. The 3/16-in. punch and die is standard but must usually be ordered extra. This motor requires a very soft brush, one having a high graphite content. The Helwig Company, 2544 N. 30th St., Milwaukee 10, Wis., can supply an excellent brush. The description of the brush follows: length, 1 in.; width, 11/64 in.; thick-

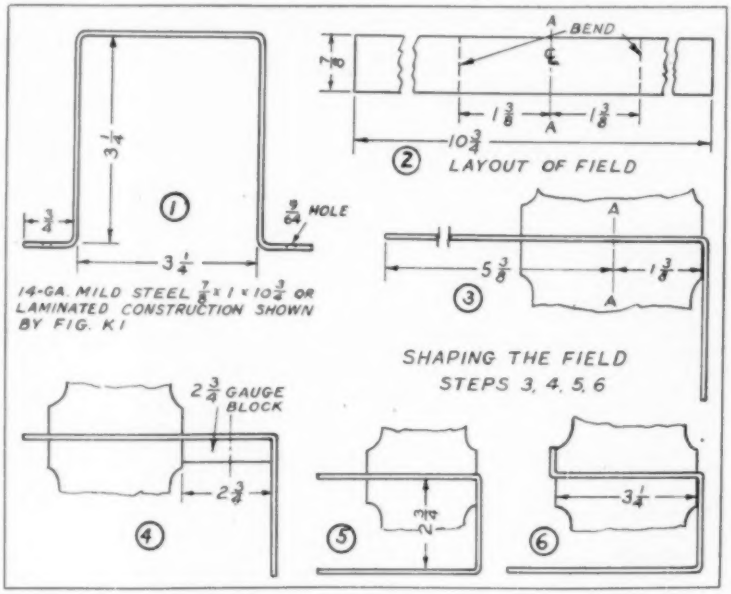

Fig. 13. Shaping the field

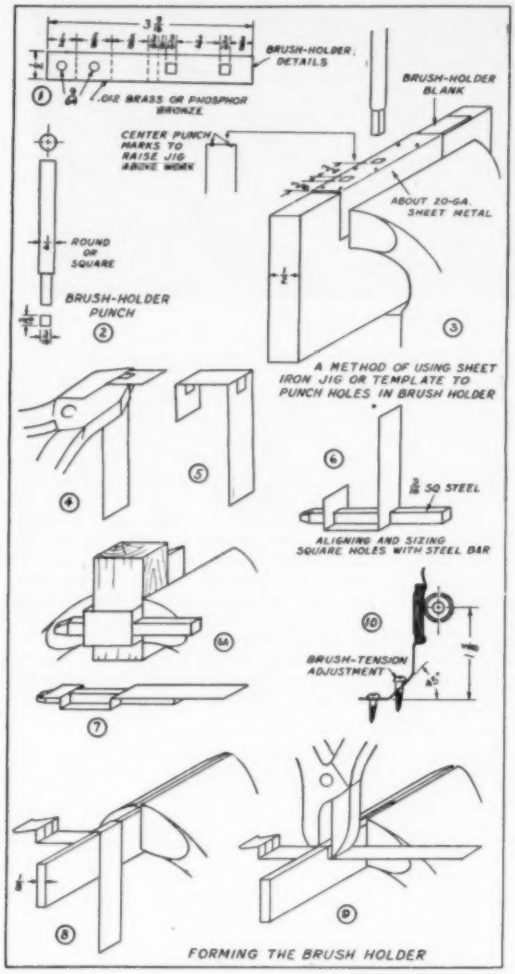
BRUSH-HOLDER DETAILS
.018 BRASS OR PHOSPHOR BRONZE
BRUSH-HOLDER BLANK
CENTER PUNCH MARKS TO RAISE JIG ABOVE WORK
ABOUT 20-GA. SHEET METAL
ROUND OR SQUARE
BRUSH-HOLDER PUNCH
A METHOD OF USING SHEET IRON JIG OR TEMPLATE TO PUNCH HOLES IN BRUSH HOLDER
SQ STEEL
ALIGNING AND SIZING SQUARE HOLES WITH STEEL BAR
BRUSH-TENSION ADJUSTMENT
FORMING THE BRUSH HOLDER

Fig. 14. The brush holder

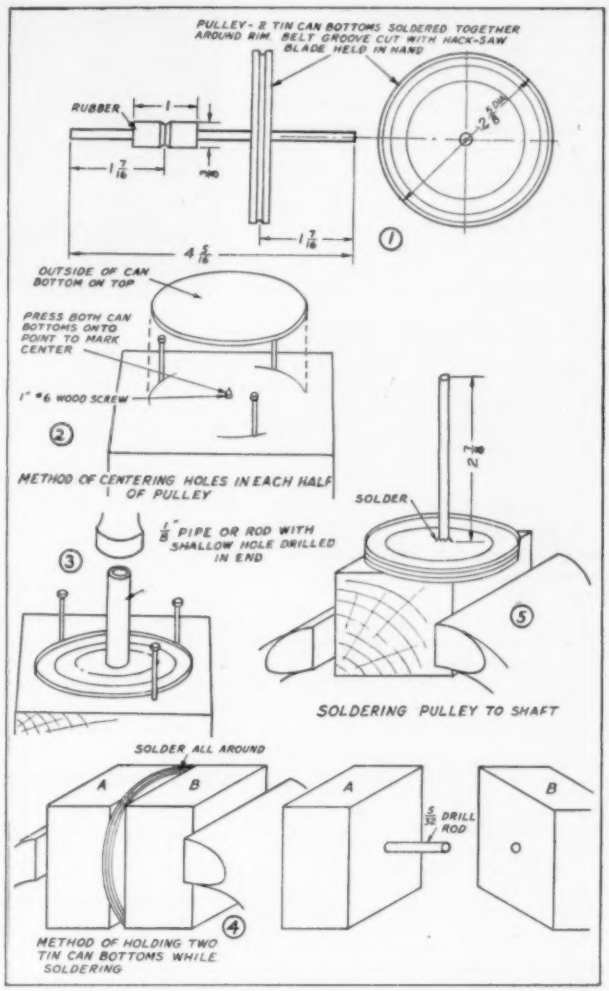
PULLEY - 2 TIN CAN BOTTOMS SOLDERED TOGETHER AROUND RIM. BELT GROOVE CUT WITH HACK-SAW BLADE HELD IN HAND
RUBBER
OUTSIDE OF CAN BOTTOM ON TOP
PRESS BOTH CAN BOTTOMS ONTO POINT TO MARK CENTER
1" #6 WOOD SCREW
METHOD OF CENTERING HOLES IN EACH HALF OF PULLEY
1/8" PIPE OR ROD WITH SHALLOW HOLE DRILLED IN END
SOLDER
SOLDERING PULLEY TO SHAFT
SOLDER ALL AROUND
DRILL ROD
METHOD OF HOLDING TWO TIN CAN BOTTOMS WHILE SOLDERING

Fig. 15. Making the pulley

ness, 11/64 in.; style V, bevel O°; no chamfer; Grade 552. Of course other manufacturers also can supply brushes of suitable grade.

When fastening the brush holders in position arrange them so that a flat face of the brush contacts the commutator. To insure perfect facing and contact hold a piece of fine sandpaper around the commutator and revolve the commutator back and forth a few times to face the brush. This is quite important because carbon offers much resistance and unless adequate contact between brush and commutator is made the motor will not operate with maximum efficiency.

Countershaft and Pulleys

The large pulley shown at 1, Figure 15, is made from two tin-can bottoms soldered together around their rims. The cut ends of the can bottoms face each other. Many wall type can openers will cut the bottoms off very closely and cleanly by inserting the can in the opener in a horizontal or near-horizontal position. It is important that the pulley be centered on the shaft and this centering is easily accomplished with the simple jig shown at 2 in Figure 15. After the can bottom is pressed onto the point a piece of ⅛-in. pipe or round or square bar with a shallow hole drilled in one end is placed over the point and tapped with a hammer as shown at 3, Figure 15. The burr produced on the tin should not be removed. It acts as a sort of hub and increases the area of contact with the shaft and when soldered produces a very solid pulley. The method of holding the can bottoms for soldering is shown at 4, Figure 15. Be sure to place the can bottom in the jig with their inside or cut edges together in order to form the belt groove. After soldering, a woodworking file may be used to remove excess solder from the groove. Do not use a fine-toothed file as it will soon clog with solder. At 5 in Figure 15 is shown a simple method of holding the pulley on the shaft in the proper place while the two are soldered together. The holes in the jigs shown at 4 and 5, Figure 15, should be drilled on the drill press to insure absolute squareness. The small pulley is merely a piece of the same kind of rubber tubing as was used for the commutator core. The belt groove can be filed with the corner of a file. This is a series motor which means that the field and armature are wired in series. Anyone not familiar with the wiring can easily trace it from Figure 3.

The boys may judge the efficiency of their motors by the weight pulling power which their motors possess. Drive the large pulley on the countershaft with the small motor

pulley. Tie a piece of strong thread or ordinary store string about 3 ft. long to the countershaft and wind a few turns around the shaft to prevent slipping. Tie a loop in the other end of the thread or string. Slip this loop over objects of different weights to judge the pulling power of the motor. This motor operated on an 8-volt transformer will pull a smooth plane along the bench. It will raise a 6 oz., or heavier, hammer from the floor with the severe handicap of the pulling string dragging over the edge of the bench or table. This motor and countershaft may be used to operate small toys. The rubber pulley on the countershaft can be used as a friction drive also.

It is well to demonstrate the performance of the motor before beginning construction. This arouses much interest and enthusiasm and some planning by the boys of what their motors will do. When such tests and comparisons are made by the boys with their own motors, they will experience a just pride in accomplishment.

PLASTIC TRAY

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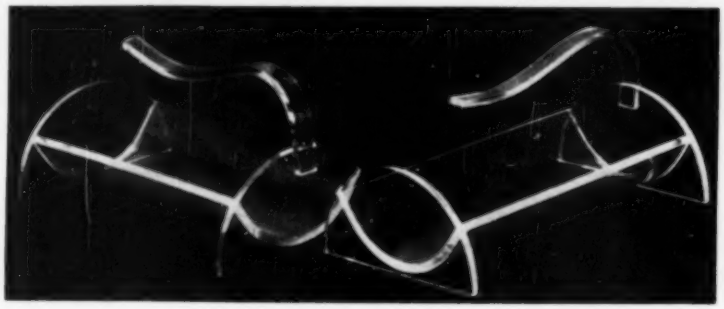
Head, Industrial Arts Department
University of Georgia
Athens, Ga.

Most people have the false conception that work in plastics is a complicated process, and that a beginner should concentrate only on the simplest projects which usually are of little value.



Plastic trays

The following tray may be constructed by using a few of the common hand tools. While it is not difficult it will take painstaking workmanship to produce a tray of real beauty.

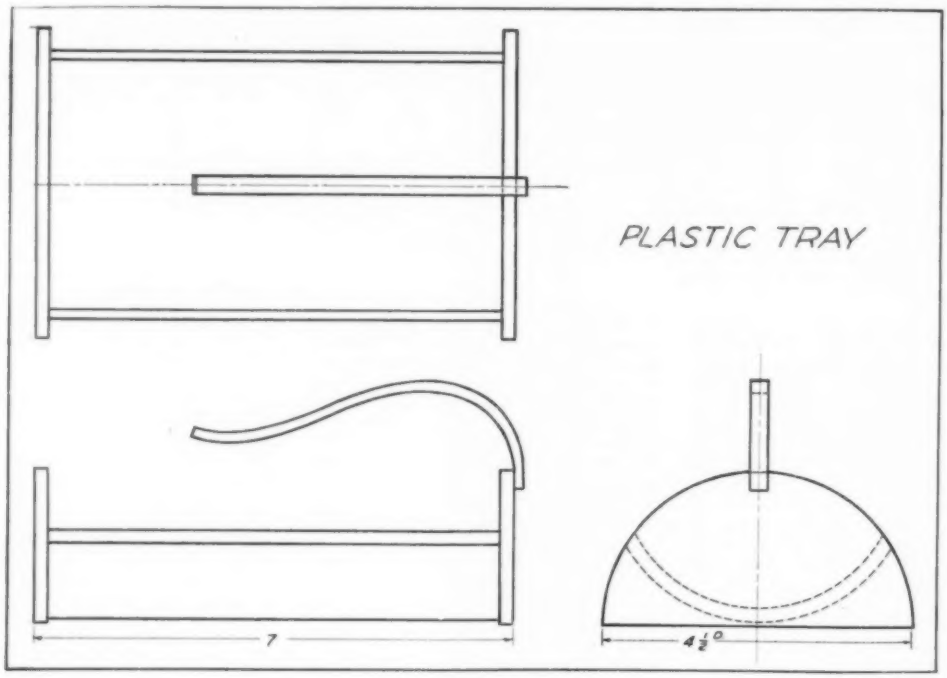
In working with plastics it is well to purchase the supplies from a reliable firm. By dealing with one company you will be able to get the correct cement for the particular plastic you may be using.

The suggested tray may be made from 3/16-in. plexiglass. First cut one circle with a diameter of 4½ in. This may be cut with a coping saw, jeweler's saw, or jig saw. Smooth with fine sandpaper or steel wool. If the line was not followed exactly with the saw then a fine file would come in handy. Cut through the middle of the circle, the two pieces making the ends.

Next cut in a similar manner one piece of plastic 4½ by 6½ in., and sand smooth. The bent portion is made on what is known as a jig. This jig may be a wood or metal cylinder. It may be well to cover the cylinder with soft cloth to prevent the grain of the wood or defects in the metal from showing on the plastic.

Before bending the plastic it should be heated in an oven to a temperature of about 250 deg. Then remove it from the oven and quickly bend it over the jig. If you are not well satisfied with the form the plastic takes then you may heat it again and try another time. It may be bent many times but try to get it exactly right the first time.

The surfaces may be cemented by a process which resembles welding. Put the cement on both pieces which are to be held together and



Details of plastic tray

the cement will soften each. Press them carefully and firmly together and in correct position and it will make a firm transparent joint. Be sure to apply the cement to both pieces. The cementing process may be done with the hands as no clamps are necessary.

The handle is a matter of individual taste. If it is used it is cut out and cemented in place.

DESK NAME PLATE

E. CLAY VENABLE

Oklahoma City, Okla.

When the National Aviation Clinic was first in the planning, the Oklahoma City Chamber of Commerce requested that the Oklahoma city schools take over and produce in their shops, the delegates' desk name-plate project. These name plates, designed for use on the desks in the House of Representatives Hall at our state capitol, proved to be such a valuable asset in connection with the convention proceedings and such a valued souvenir for the delegates that it has become a standard item for each convention.

Each year we have produced a new design. During the war years we confined our designs to construction from various kinds of wood that were available.

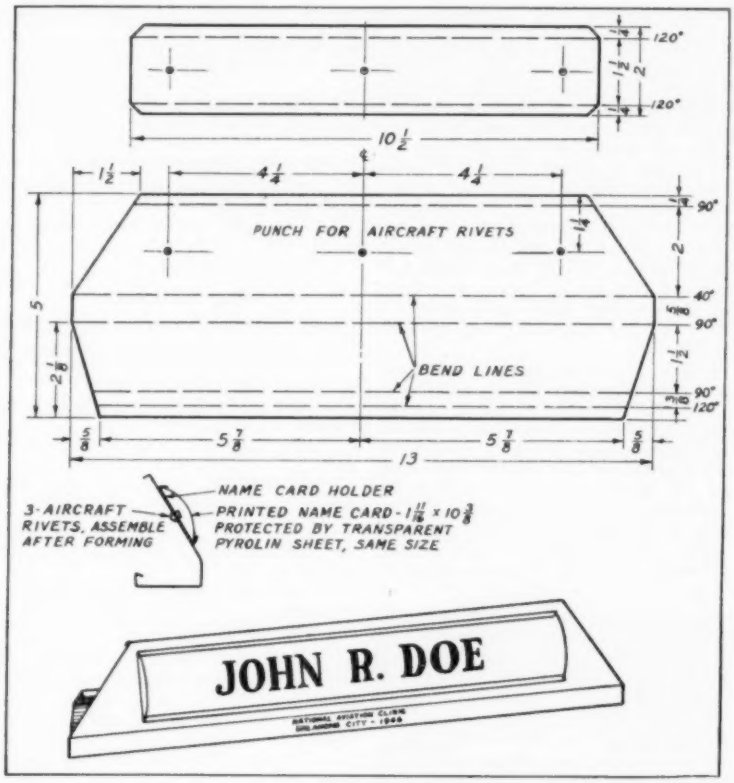
For the 1946 Clinic we decided to take advantage of the fact that we had been able to accumulate quite a stock of aluminum from war production surplus and produce a desk name plate from sheet aluminum.

Since Oklahoma City was the site of a Douglas Plant specializing in the production of C-54's, we decided to use material which was originally planned for use as "skin" on the C-54.

This design proved to be more popular than any we had heretofore produced, and we have been swamped with requests from other organizations for this and similar designs.

In order to give students experience in assembly-line production this project was set up to be produced under assembly-line methods, both in the sheet metal and in the printing shops.

Those responsible for the production of the project were William E. Taylor, instructor, metal-trade classes, and B. H. Thomas, instructor, printing-trade classes.



Aluminum name plate designed by E. Clay Venable and William E. Taylor, public schools, Oklahoma City, Okla.

DECANTERS

ALFRED WIEDA

Instructor, Industrial Arts

Manual Training High School

Brooklyn, N. Y.

At very little cost, and with great educational value, attractive decanters can be made from empty bottles. Oddly shaped bottles are preferable to ordinary bottles because of the pleasing effects that can be achieved with them.

Bottles turned into decanters

Into this attractive project go a number of skills: design, woodworking, wood turning, art metal, engine lathe work, and finishing. Making these decanters furnishes a fine general shop project.

The shape of the bottle is transferred to a piece of stiff paper by tracing its shadow or blocking it parallel to the paper and drawing around it with a pencil held vertically. A knob and handle, appropriate to the shape of the bottle, is then drawn, remembering that the handle must land on the bottle at a point where the bands, which are going to hold it, will grip. The design is transferred to the stock which is to be used for the handle, after which it is sawed and fitted to the curve of the bottle.

The metal bands for holding the handle are cut and hammered to fit the curve or taper of the bottle at the points they are to grip. One end is bent to fit against the handle, and the length is measured by fitting and bending the other end. Rubber bands to hold the handle in place while this fitting is being done are helpful. One-eighth inch holes are drilled through the ears of the bands and the handle for fastening.

A piece of ⅛-in. rod is threaded, and stock hexagon nuts or, better still, a piece of hexagon stock is turned and tapped to form acorn nuts which can be used to hold the bands to the handle.

A recess is turned in the knob to take a plastic screw cap, into which a cork may be cemented.

The knob and handle should be removed, rounded up, and both given any desired finish.

Falls are one of the three principal sources of compensable industrial injuries.

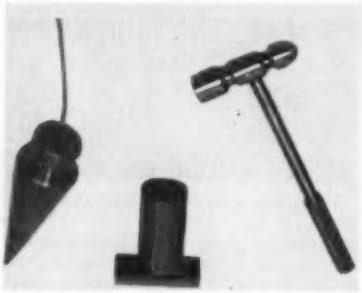
THREE SIMPLE MACHINE-SHOP PROJECTS

E. R. GLAZENER

Head, Industrial Education Department
Arkansas Agricultural and Mechanical College

Monticello, Ark.

Frequently students have difficulty in choosing a project for the first effort to be made in the machine shop. To help them over this hump, the instructor must guide the class immediately toward some worth-while projects, in order that he may maintain and develop further interest in the work which he is offering.



Three simple machine-shop projects

The projects shown herein have proved interesting and satisfactory in many instances. After the student has made one of the inexpensive projects shown, it is suggested he design a larger ball-peen hammer, or other suitable project, to be made out of tool steel. This will add further processes and operations, and a knowledge of the heat treatment of tool steel as well.

Tools, Equipment, and Machines

Steel rule, ball-peen hammer, scriber, center punch, hand or power hack saw, machinist's vise, tail and head stock drill chuck, combination square and center-head attachment, center drill or centering machine, drill-press vise, drill press, No. 14 twist drill, machine lathe with cutter bits and accessories, files, 12-28 tap with wrench, 12-28 die, outside caliper, micrometer, arbor or hydraulic press, ⅜-in. drill, No. 28 drill, 3/16-in. drill, and other minor tools and supplies, depending on what is available.

BILL OF MATERIAL

No. of pcs.	*Material*	*Size*
1	Machinery steel, round	½ by 7 in.
1	Machinery steel, round	¾ by 3½ in.
	Emery cloth, cutting oil, or other cutting compound, and oil as recommended for internal lathe oiling	

Procedure for Hammer

1. Student should obtain approval of the instructor for the project chosen and be checked on the use of the machines which he is to use. Obtain stock for hammer head and handle and saw to proper length.

2. Use one of several methods to locate centers of ends of hammer head and handle. Center drill using drill chuck with center drill in lathe or centering machine.

3. Put faceplate on lathe, with the proper centers in head and tail stock. Mount the hammer head in lathe for turning, using lathe dog. Always check lathe before using. Be sure that the lathe has been properly lubricated.

4. Select cutter bits and toolholder and turn steel to the proper diameters and lengths. Sharpen the bits before turning. Facing the ends of all stock can be taught, if desired, but it is not necessary on this project, if the ends of the stock have been cut reasonably true with the hack saw.

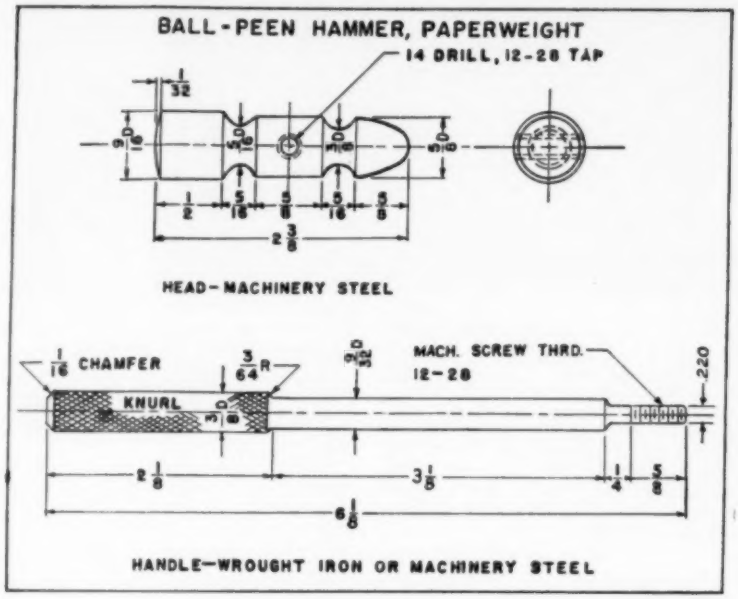
5. Turn diameters as shown. The peen end should be partially turned. Check sizes with calipers; finish all surfaces except two ends, and check finished size with micrometer to ± .003.

6. Remove hammer head from lathe and follow steps 1 through 5 in making the handle.

7. Knurl handle using knurling tool and holder in the tool post.

8. Remove the handle from the lathe. Cut off surplus material from ends of head and handle. Care should be taken to protect finished surfaces in all clamping operations by using copper or other soft metal vise jaws.

9. Replace faceplate on lathe with universal chuck. Mount hammer head and finish both ends with files and emery cloth. Finish handle ends in same manner and remove from lathe.



Details of small hammer

Assembly Procedure for Hammer

1. Drill hammer head with No. 14 drill and tap with 12-28 tap.

2. Clamp handle in vise and cut external threads with 12-28 die.

3. Assemble handle and head.

Safety Precautions

1. Remove all jewelry and wear no loose fitting clothing.

2. Keep all waste and tools clear of moving or working parts.

3. Check all machines before turning on switches.

4. Oil all machines as necessary with proper lubricant.

5. Check and use proper feeds, speeds, and depth of cut.

6. Always check to see that material being worked is mounted and clamped properly and securely.

7. Use proper coolant or cutting compound if necessary.

8. Use only sharp cutter bits.

9. Use machines and tools only after you have received instruction on how to operate them.

10. Use all tools and machines properly. Leave them clean, and apply a thin film of oil after exposure to damp hands to prevent rust.

11. Always protect V ways of lathe bed when cutting off pieces on the lathe that may drop and injure bed.

Procedure for Bench Stop

1. Follow same procedure for part *A* as given in steps 1 through 4 in the directions for turning the ball-peen hammer. However, part *A* of this project may be turned in the lathe without center-drilling by using the universal or independent chuck as the holding device on the lathe. Facing should be taught and used.

2. Turn proper diameters and lengths and check finished diameters closely with micrometer.

3. Use cutoff tool in holder and cut off to suggested length of 2 3/16 in., and remove surplus from lathe.

4. Cut stock for part *B* from flat stock ¼ by 1¼ by 2¼ in.

5. File and finish to proper size, locate center, and drill ½-in. hole.

6. Assemble *A* and *B* with a press fit. This is satisfactory in most instances, but the tip end of the 3/16-in. portion of part *A* may be center-punched near the edge of the .510 dia. to prevent the round piece from turning in the hole.

Procedure for Plumb Bob

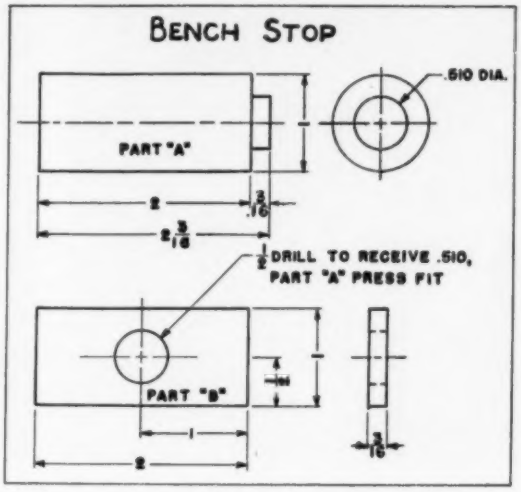
1. Follow same procedure for turning the plumb bob as given in steps 1 through 4 for turning the ball-peen hammer. However, the universal or independent chuck serves more adequately as the lathe holding device for this project.

2. Turn proper diameters and lengths.

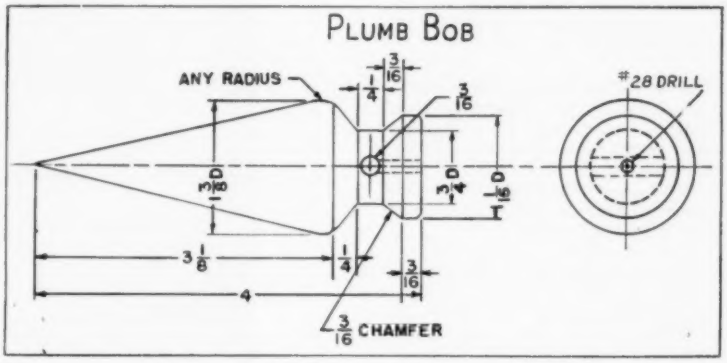
3. The taper for this project is designed here to be cut and finished by hand; however, use of the taper attachment or other means of tapering may be used if desired.

4. Cut off to proper length, protecting V ways. Hand-finish or finish large end in lathe.

5. Drill No. 28 and 3/16-in. holes in proper position and direction and add drop cord.



Details of bench stop



Details of plumb bob

GOOD ENGINE LATHE CENTERS

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Fifth Avenue High School
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Admittedly, it is good practice and pedagogy to have boys make engine lathe centers. Nevertheless, the educational outcomes do not justify the time consumed in a short-period industrial arts setup. It is, therefore, necessary to find some other method of getting practical centers which do not wear out in a hurry.

The illustration shown herewith shows two good centers which can be made in a hurry. We used broken high-speed drills picked up in a machine-shop dump. This got us away from carbon tool steels and cold rolled steels with high-speed inserted tips.

Educationally, the only real job is the tapering, and this is compensated for by the time saved.

To make the lathe center:

1. Select old worn or broken high-speed drills with tapered shanks to fit the lathe sleeves you use.

2. Offhand grind point end to remove excess material.

3. Set up in lathe chuck with shank end protruding; remove burrs, polish and recondition shank to properly fit lathe sleeves.

4. Remove center from chuck. Remove chuck from lathe. Fit center to head stock spindle.

5. Set up center grinder. Grind point of center. Make sure to protect the lathe from emery dust. Wear goggles.

Broken drills converted into leather centers

No dimensions are given here because we work with a sight proportion to the flute ends of the drills.

SELSYN MOTOR OPERATION OF FILM-STRIP PROJECTORS

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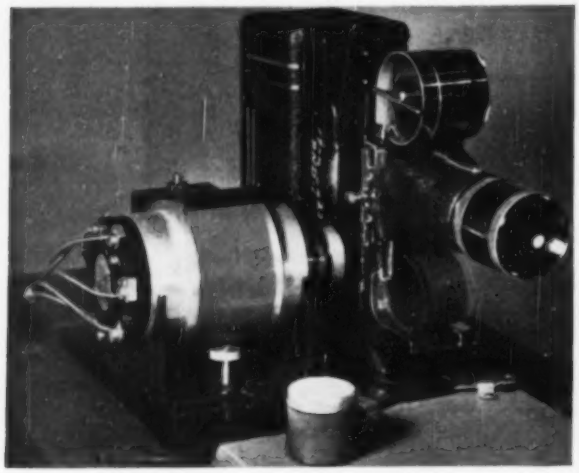
Director, Division of Audio-Visual Materials
and
DON D. HENNIGAN
Toolmaking Instructor
Williamsport Technical School
Williamsport, Pa.

The addition of remote-control devices to standard film-strip projectors provides numerous advantages conducive to good teaching. The limited use of remotely controlled film-strip projectors is due for the most part to the extra cost of the control device.

In addition to enumerating some teaching advantages of the remote-controlled film-strip



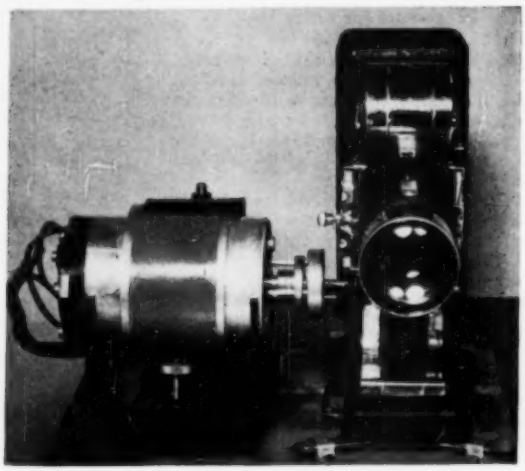


Fig. 1 and Fig. 2. Receiver motor attached to projector. Both motor and projector are mounted on same base

projector, the writers present a practical shop project in the attachment of Selsyn motors to a standard film-strip projector.

Some Advantages of Remote Control

A film-strip projector equipped with a remote-control device enables the instructor to stand at the front of the room near the screen while he operates the projector located at the rear of the room. This arrangement provides the classroom situation most natural for both the teacher and the student.

From a position near the screen the instructor can point to pertinent information as it appears on the screen in a manner similar to that employed when using the blackboard as a teaching aid.

With the instructor at the front of the class, students face simultaneously the two most important elements in a projected-aids lesson — the instructor and the screen. Close attention to the screen, a prerequisite to learning in a projected-aids lesson, and proper attention to the teacher at the opposite end of the room is difficult.

In large classrooms or auditoriums, the remotely controlled projector eliminates the need of an assistant to operate the projector. The use of a projection assistant has one major shortcoming. Any type of signal between the instructor and the operator, either visual or auditory, has a distracting influence on the film lesson.

The Selsyn Motor

The Selsyn, or synchronous-drive motor, is designed to transmit motion electrically between two points. The Selsyn principle is commonly used in position indicator devices of the type employed for elevator floor-level indicators.

Cyril G. Geinott explains the operation of the Selsyn motor as follows: "The synchronous-drive motor, or position indicator, is an electric motor, called a receiver, which follows the motion of another similar machine, called the transmitter, to which the receiver is electrically connected, in much the same fashion as if the two machines were coupled together mechanically. The transmitter does not run like a motor but is mechanically driven like a generator. The receiver will then follow the transmitter — within the torque limits of the machines — in either direction at any speed just as if the two machines were coupled by an invisible shaft."*

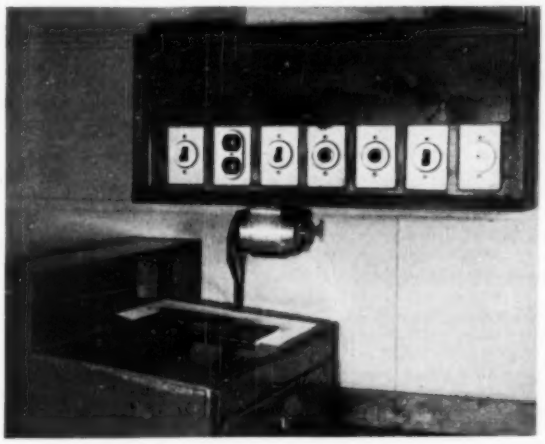


Fig. 3. Selsyn motor operation of film-strip projectors

Selsyn motors are available commercially from several motor manufacturers. However, good quality Selsyn motors are readily available from many army-navy surplus stores in prices ranging from five to ten dollars per pair.

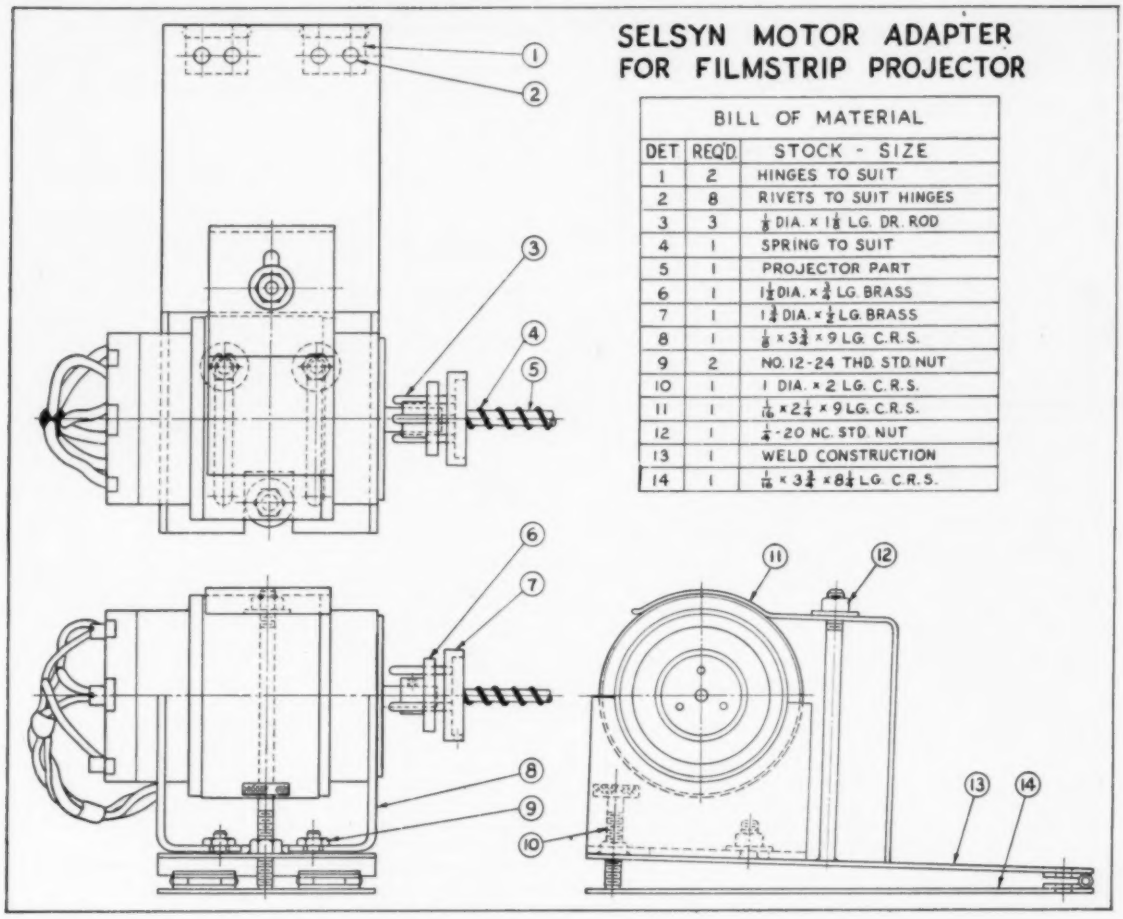
*Cyril G. Geinott, "Fractional Horsepower Electric Motors" (New York: McGraw-Hill Book Company, Inc., 1939).

Fabrication and Assembly

The motor mountings and connecting assembly, as shown in the working drawings, can easily be fabricated and assembled in the school shop by high school students. The project provides practical training operations on the lathe and drill press, together with experience in layout and benchwork.

As shown in the bill of material, most of the parts are made of steel or brass. However, aluminum may be substituted for the steel parts when the assembly is to be portable rather than fixed in one location.

The receiver motor is attached to the projector as shown in Figures 1 and 2. A common base mounts both the projector and the receiver motor. The transmitter motor, with which the instructor operates the projector, can be mounted as a portable control unit when the projector will be used in numerous class-


SELSYN MOTOR ADAPTER
FOR FILMSTRIP PROJECTOR
BILL OF MATERIAL
DET | REQ'D. | STOCK - SIZE
1 | 2 | HINGES TO SUIT
2 | 8 | RIVETS TO SUIT HINGES
3 | 3 | 1/8 DIA. x 1 1/8 LG. DR. ROD
4 | 1 | SPRING TO SUIT
5 | 1 | PROJECTOR PART
6 | 1 | 1 1/2 DIA. x 3/4 LG. BRASS
7 | 1 | 1 3/4 DIA. x 1/2 LG. BRASS
8 | 1 | 1/8 x 3 1/2 x 9 LG. C.R.S.
9 | 2 | NO. 12-24 THD. STD. NUT
10 | 1 | 1 DIA. x 2 LG. C.R.S.
11 | 1 | 1/16 x 2 1/2 x 9 LG. C.R.S.
12 | 1 | 1/4-20 NC. STD. NUT
13 | 1 | WELD CONSTRUCTION
14 | 1 | 1/16 x 3 3/4 x 8 1/2 LG. C.R.S.
1
2
3
4
5
6
7
8
9
10
11
12
13
14

Selsyn motor operation of film-strip projectors. **See details on page 332**

rooms. In situations where the projector will be used in only one projection room, it will be more convenient to make a fixed installation on a side wall near the screen location. Figure 3 shows a transmitter motor attached to an instructor's station panel in a projection classroom of the Williamsport Technical Institute.

A lightweight, five-stranded wire is used to connect the transmitter motor to the receiver motor. Numbered and lettered motor terminals indicate the correct wiring circuits.

Operation of the Assembly

The projector motor and connecting assembly does not interfere with normal threading and framing procedures. The projector is made ready in the usual manner.

After the picture has been focused, framed and positioned on the screen, frame changes are made from the teacher's location at the front of the room by turning the control knob on the transmitter motor. The strip can be turned forward or backward.

GOLD ELECTROPLATING DISPLACED BY NEW ROLLING PROCESS

Thin as electroplate, new rolled gold plate enables manufacturers to eliminate polishing and finishing.

First major advance in mechanical plating since 1742.

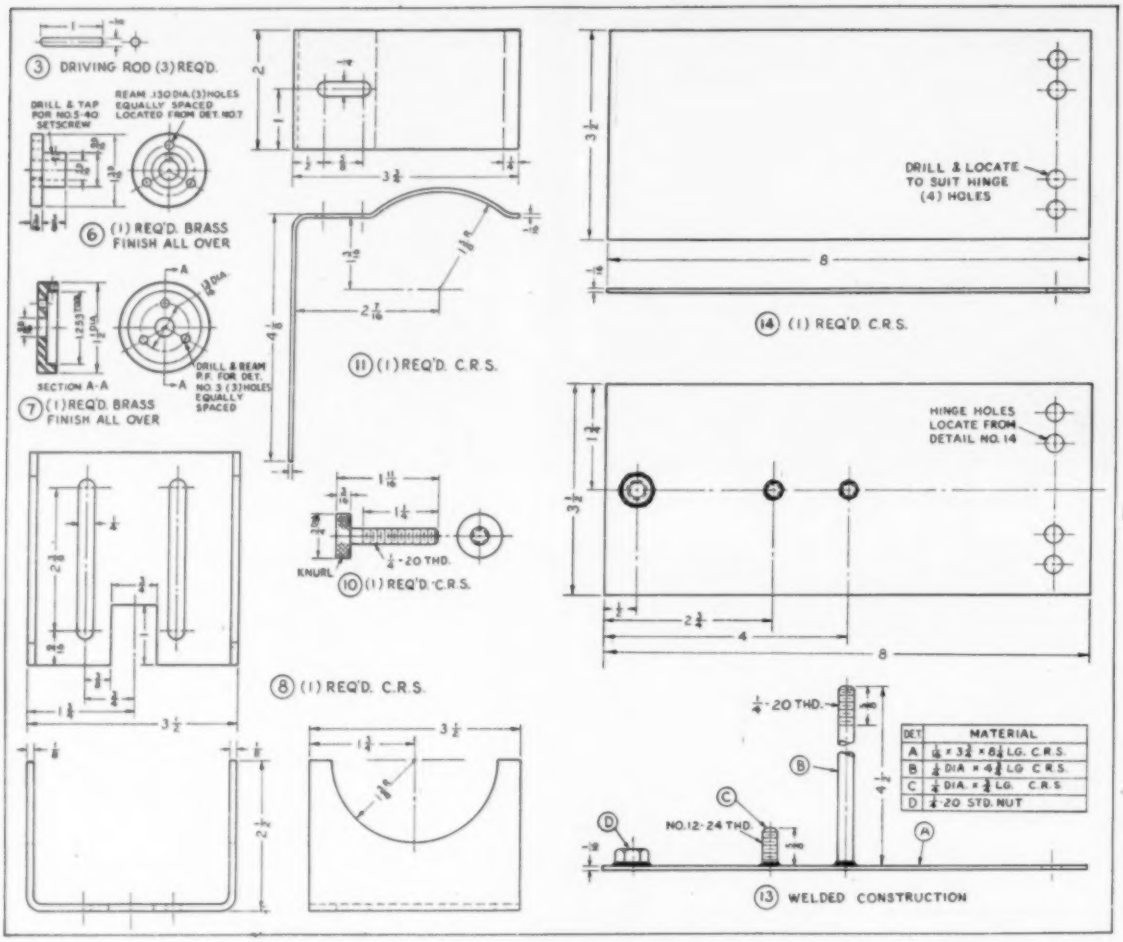
Karat gold can now be rolled to a mirror finish and as thin as electroplate on any nonferrous metal base through the development of the Inter-Weld Process by the gold filled division of the American Silver Company, Inc., Flushing, N. Y.

Manufacturers of fountain pens, compacts, costume jewelry, novelties, cosmetic items, buckles, buttons, and a host of others will find this new method a tremendous timesaver over the conventional method of manufacturing from brass and then polishing and electroplating to achieve the desirable gold color. In addition, the finished article is actually improved in quality, since the rolled gold layer is far tougher and longer wearing than a comparable thickness of gold electroplate.

Welded Instead of Soldered

Improving on the so-called "Old Sheffield Process" wherein a layer of karat gold is silver soldered to a base metal, in the ASC Inter-Weld Process the gold layer is *welded* to a barrier layer of pure nickel and then this dual thickness is soldered to the base metal in the conventional manner.

In the past it has been found impossible to manufacture mechanically plated karat gold rolled down to thicknesses approaching gold electroplate because of the tendency of the silver solder used as a bonding agent to diffuse or "bleed" through to the surface of the gold and present a mottled, streaked appearance. By welding the gold layer instead of soldering it, and by the introduction of the barrier layer of nickel this "bleeding" is overcome completely. Ratios as low as 1/600 have been achieved with a karat gold thickness of 9/1,000,000th of an inch and less with a brilliant mirror finish and no sign of "bleeding."


3 DRIVING ROD (3) REQ'D.
DRILL & TAP FOR NO.5-40 SETSCREW
REAM .130 DIA.(3) HOLES EQUALLY SPACED LOCATED FROM DET. NO.7
6 (1) REQ'D. BRASS FINISH ALL OVER
SECTION A-A
DRILL & REAM P.F. FOR DET. NO. 3 (3) HOLES EQUALLY SPACED
7 (1) REQ'D. BRASS FINISH ALL OVER
11 (1) REQ'D. C.R.S.
KNURL
1/4-20 THD.
10 (1) REQ'D. C.R.S.
8 (1) REQ'D. C.R.S.
DRILL & LOCATE TO SUIT HINGE (4) HOLES
14 (1) REQ'D. C.R.S.
HINGE HOLES LOCATE FROM DETAIL NO. 14
1/4-20 THD.
NO.12-24 THD.
DET. MATERIAL
A 1/16 x 3 1/2 x 8 1/4 LG. C.R.S.
B 1/4 DIA. x 4 1/2 LG. C.R.S.
C 1/4 DIA. x 3/4 LG. C.R.S.
D 1/4-20 STD. NUT
13 WELDED CONSTRUCTION

Details of Selsyn motor operation for film-strip projectors. See article on pages 329–331

The interposition of the nickel barrier and the use of welding instead of silver solder represents the first major advance in mechanical plating of precious metals since 1742 when Bolsover, a silversmith of Sheffield, England, first developed what has since become known as the "Old Sheffield Process."

While the ASC Inter-Weld Process was developed primarily for the manufacture of rolled gold plate and gold filled, it is equally adaptable to the manufacture of silver items such as hollow ware, jewelry, and novelty articles now using silver electroplate.

As stated above, the effect of the ASC Inter-Weld Process on the jewelry, cosmetic, novelty, and allied industries will be widespread. The new method avoids the use of the expensive polishing and electroplating operations after fabrication in order to achieve the ever popular gold color. Actually, of course, this follows a definite trend in industry which replaces expensive hand operations by superior and less expensive machine methods. In this instance, the resultant articles will be improved in quality because of the mirror finish and superior durability of rolled gold plate, even when as thin as electroplate. In ordinary gold electroplate the gold layer is usually less than 5/1,000,000th of an inch thick, soft and spongy, being deposited on the base metal by electrical attraction, whereas in rolled gold plate the repeated processes of heat and tremendous rolling pressures produce a dense, tough, and durable layer of alloyed karat gold of any desired thickness.

Improved Color and Surface Texture

With the ASC Inter-Weld Process the color of the gold on an article can be accurately controlled, and the color will be uniform regardless of the thickness of the gold. One or both sides of a sheet may be plated to the same or different specifications of texture, color, and thickness. ASC Inter-Welded rolled gold plate is furnished in rolls, the coils interleaved with tissue or if preferred protected by a plastic strip coating which may be left on during the stamping and drawing operations.

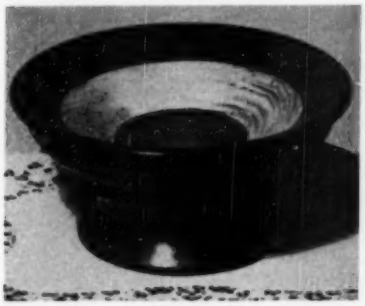
For the first time the ASC Inter-Weld Process makes possible the production of ultra-thin rolled karat gold surfaces which can compete effectively with electroplate. It is also a vast improvement in the manufacture of higher commercial qualities of gold filled and rolled gold plate such as are presently used in the manufacture of fountain pens, watch cases, men's jewelry, watch bands, and optical items. ASC Inter-Welded gold filled and rolled gold plate can be supplied with a base of brass, nickel silver, nickel, monel, cupro-nickel, or beryllium copper.

Stop, look, and lessen grade crossing accidents, the National Safety Council advises. Slow up before the crossing, don't stop dead at it. If the train gives a hoot for your life, so should you.—*Safety News.*

FRUIT BOWL

E. R. GLAZENER
Head, Industrial Education Department
Arkansas Agricultural and Mechanical College
Monticello, Ark.

The turned fruit bowl is an excellent wood-turning project for the student who has learned



Fruit bowl

the first basic fundamentals of this phase of machine woodwork. This one project allows the worker to use several machines and do a number of hand processes. While the job is simple, it is a means whereby the student can display his initiative and design.

Two suggested shapes are shown in the accompanying drawing, but the designs possible are unlimited. The material used for the bowl shown in the photograph is an exceptionally light-colored yellow poplar, and a red gum. However, black walnut and maple, red gum and magnolia, solid red gum, or solid walnut all make beautiful fruit bowls.

The tools and equipment, materials, and the machines that may be used, together with the step-by-step procedure follows.

Tools, Equipment, and Machines

Bench rule, handsaw, try square or framing square, dividers, or compass, hand screw wood clamps, lathe tools, calipers, pencil, screw driver, hand drill, twist drills, table saw, band saw, lathe, thickness planer, and drill press.

Materials

Wood, wood screws, glue, sandpaper, wood filler, shellac or lacquer, varnish, steel wool, pumice, rottenstone, felt, and wax.

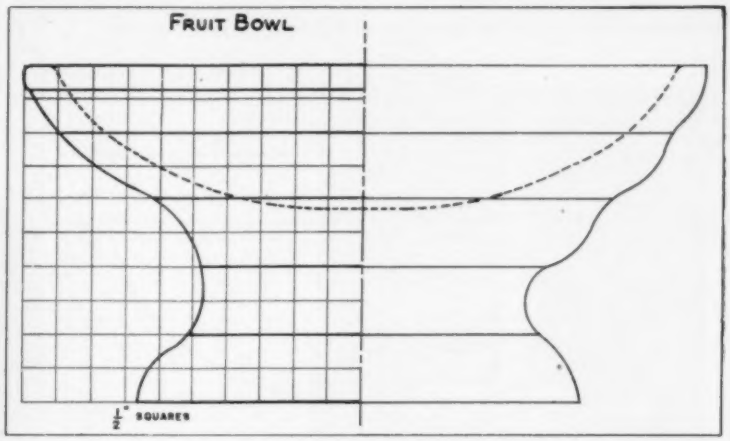
Wood for two bowls as shown:

BILL OF MATERIAL

No. of pcs.	*Size*
1	1 x 12 x 24
1	1 x 10 x 20
2	1 x 8 x 16
1	1 x 6 x 12

Procedure

1. Make drawings or pattern of the chosen design.
2. Secure stock as desired, referring to drawing or pattern for amount needed.
3. Plane to required thickness.



Layout for fruit bowl

4. Lay out circles of required size on stock allowing for turning, and saw them out on the band saw.
5. Glue circular pieces together for selected rough design.
6. Let stand overnight or as long as necessary, depending on type of glue used.
7. Attach to faceplate of wood-turning lathe and turn to desired shape.
8. Sand with rough and then fine sandpaper until all blemishes are removed.
9. Apply wood filler if necessary to seal pores of wood used.
10. Finish with one coat shellac or lacquer, and two coats of rubbing varnish, rubbing between coats with fine steel wool, pumice and oil, or other suitable abrasive. Some other desired finish may be used, such as, spar varnish.
11. Rub last coat thoroughly with rottenstone and oil or other proper finishing material.
12. Glue felt to base.
13. Remove all oil and apply one or two coats of wax.

FOUR MULTIPLE-PURPOSE SPINNING CHUCKS

JAMES O. REYNOLDS
Instructor, General Metals
McKinley Occupational School
Dayton, Ohio

The number of projects that can be made by metal spinning is limited only by the imagination or ingenuity of the craftsman. In the school shops where metal spinning is taught, a few well-designed and constructed chucks may eliminate much confusion and save material and yet permit the student to have considerable choice in the selection of a project.

The four projects described in this article were designed so that several different articles could be made out of the various spun shapes. Each chuck presents a different problem in spinning so they are identified as *A*, *B*, *C*, and D, in the order of their difficulty to spin.

In the construction of the chucks, kiln-dried maple is perhaps the only suitable wood to use. If they are to be used with a lighter lathe, the chucks should be of one-piece construction as they are fairly bulky for the smaller machinery. Check the chucks daily for distortion since atmospheric changes may warp them slightly. If this occurs a redressing is in order even if it changes the contour slightly. Out-of-round chucks are not safe for the beginner to use.

The actual spinning methods have been discussed in an earlier article and they apply identically to these projects. Aluminum should preferably be used for these spinning exercises.

The Table Lamp

The table lamp shown in Figure 1 received a first prize in one of the wrought-aluminum groups at the 1948 Industrial Arts Fair in Chicago.

Four chucks, *A*, *B*, *C*, and *D*, are needed to construct this project. Chuck *A* being the easiest to spin is made first. Chuck *B*, having a rounded shape which is more difficult to spin, is made next. Note that there must be sufficient clearance to allow for a snug fit of the two pieces. Chuck *C*, while being easy to spin over requires a beaded edge which is more or less difficult, depending somewhat on the initial patience of the operator. Due to the fact that chuck *D* is quite a bit deeper, it will be the most difficult for the student, but adherence to standard spinning practice will enable him to complete it.

Surface finishing is best done on the lathe after the piece has been spun. After the four pieces have been finished they are assembled using a ⅜-in. threaded pipe with a lock nut on each end. It is advisable to install a rubber or plastic grommet in the hole in the base where the light cord is to enter.

This particular style of lamp needs the addition of a harp upon which to attach the shade.

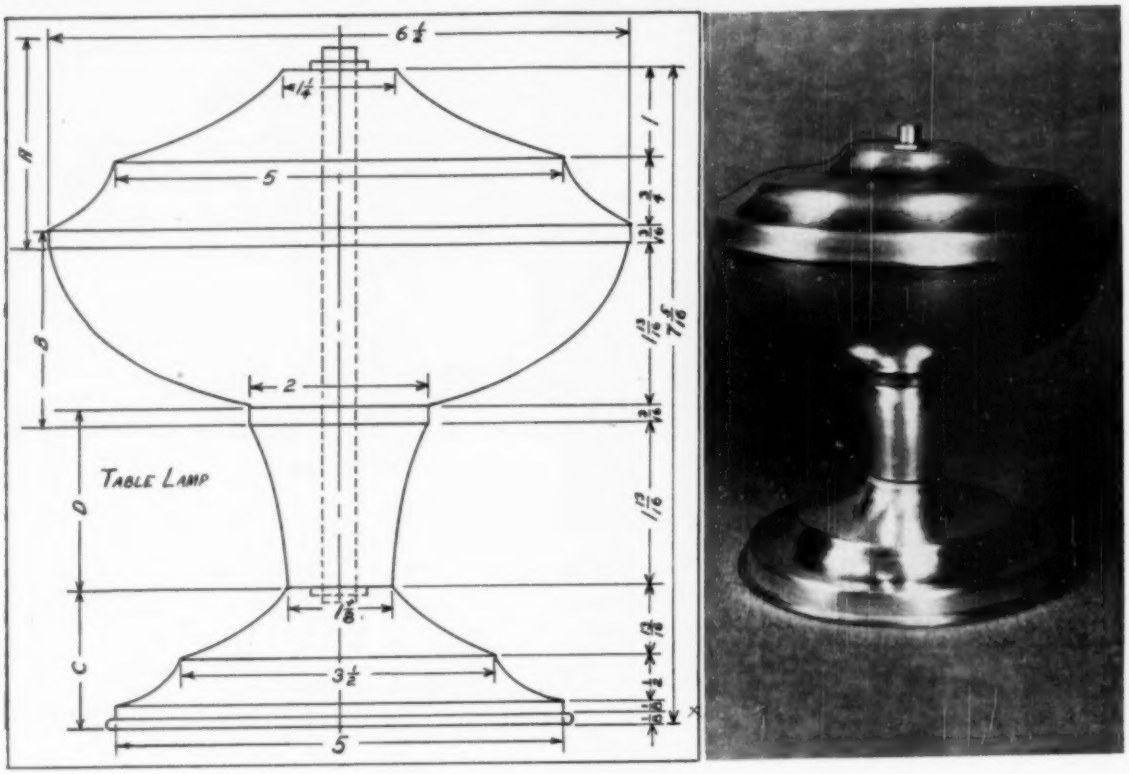

6 1/2
1 1/4
5
A
B
2
C
D
TABLE LAMP
1 1/8
3 1/2
5
1
3/4
3/16
13/16
7/16

Fig. 1

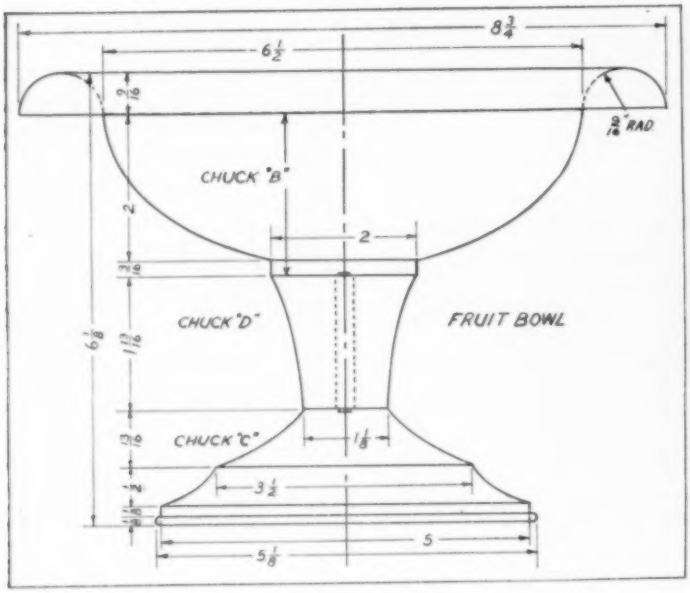

8 3/4
6 1/2
3/16
3/16" RAD
CHUCK "B"
2
2
3/16
CHUCK "D"
FRUIT BOWL
6 1/8
1 13/16
13/16
CHUCK "C"
1 1/8
3 1/2
1/2
5
5 1/8

Fig. 3

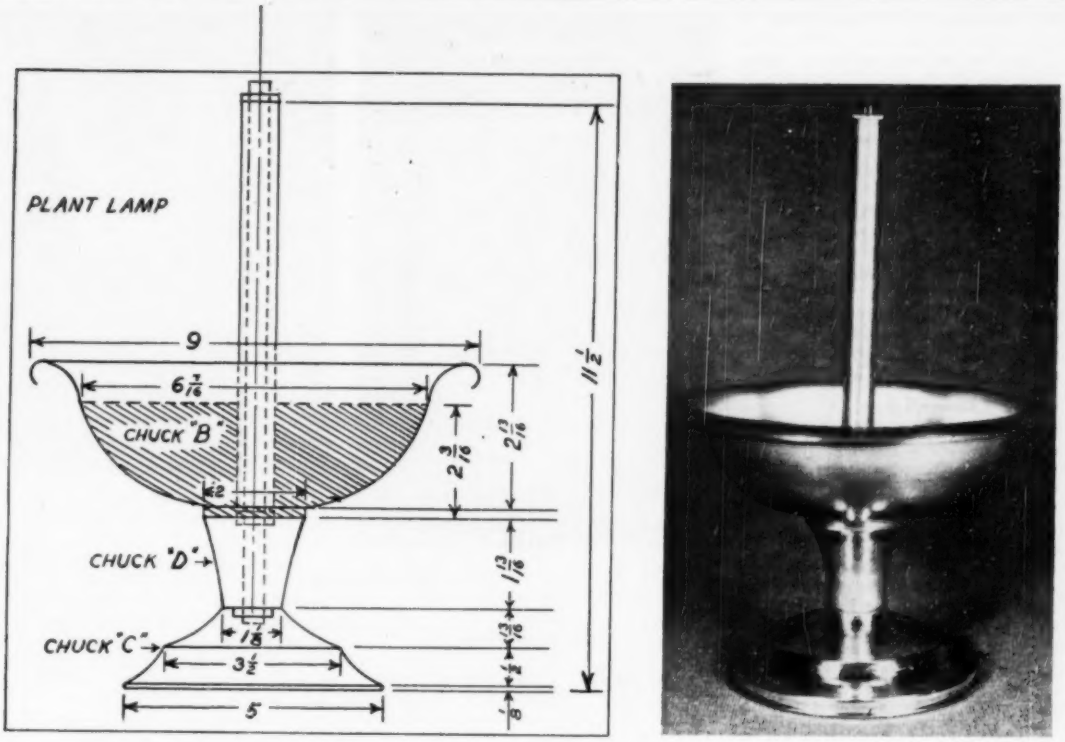


Fig. 2

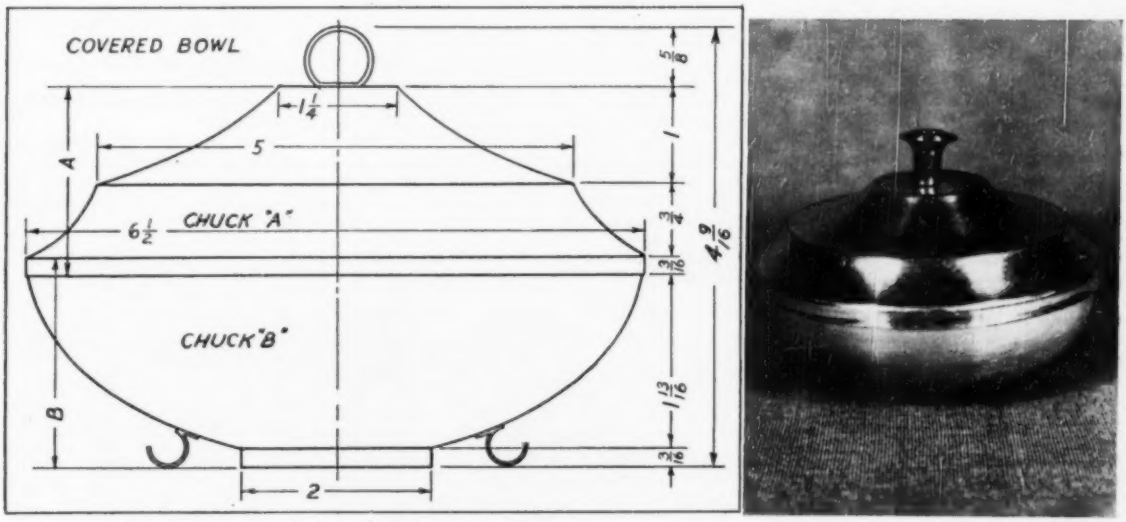


Fig. 4. Covered bowl and details of spinning chuck

The Plant Lamp

The plant or flower lamp, shown in Figure 2, received an honorable mention award in the same group as the table lamp. It is constructed over three of the same chucks — *B*, *C*, and *D*. When spinning over chuck *B* a disk 11 in. in diameter is used. This allows for the roll back to give the piece a bowl effect. This procedure is easily accomplished since the natural tendency of the metal is to roll back. The use of the back stick will aid in preventing wrinkles and give the edge a neat roll.

When assembling, ⅛-in. threaded pipe is used with a lock nut on both top and bottom of the bowl to minimize leakage of water. The upper part of the threaded pipe may be covered with a hollow aluminum or plastic tube. The length of this piece may also be determined by the style of shade chosen or the variety of plants desired.

Fruit Bowl

The fruit bowl shown in Figure 3 is identical in construction with the plant lamp with the three pieces *B*, *C*, and *D* solidly fastened together with an aluminum rod riveted on both ends.

This project will need to be finished inside as well as outside which may well be done by reversing the piece on the lathe. Be sure to use a suitable holding block, however.

Covered Bowl

Chucks *A* and *B* may be used to make the covered bowl, shown in Figure 4. These may be used as powder boxes, pin trays, candy or nut bowls, etc.

The base of the chuck is not of sufficient diameter to permit the bowl to stand solidly, so the addition of three feet of some design will make it more stable. The knob may be made or purchased. A greater clearance being desired may be accomplished by not spinning the metal so tightly on the rim of chuck *A*.

The size of the metal disks needed for these chucks may vary according to the material used. The lamps illustrated were spun of aluminum with chucks *A* and *B* requiring disks 9 in. in diameter, while chuck *C* takes a 7-in. disk, and chuck *D* one that is 4 in. in diameter. If other metals, such as copper or brass, are used it would be wise to increase the above dimensions by 1 in. in each case, since these metals will not stretch as aluminum does.

PHOTO STAND

HOMER C. ROSE
Falls Church, Va.

The photo stand, shown in Figure 1, is constructed of a discarded film pack holder and one piece of sheet metal. The project is very simple to construct as it involves only a few basic operations on one piece of sheet metal.

Film packs are used with many modern cameras. When the film is developed, the photographer has no further use for the metal pack holder and it is discarded. Figure 2 shows one of the packs disassembled. Such holders are available from many amateur and professional photographers.

Photographs fit readily into the pack, and may be displayed to advantage in the holder, shown in Figure 3. Because there is space in the pack to hold eight or ten snapshots this photo stand facilitates changing photographs frequently.

Film packs are sold in a number of different sizes and the dimensions for the holder, Figure 4, should be modified for each size other than the 2¼ by 3¼-in. film pack for which it was designed.

Fig. 1. Photo stand from a discarded film pack

BILL OF MATERIAL

No. of pcs.	*Name*	*Material*	*Size*
1	Holder	I C bright tin, 20-ga. sheet aluminum or 20-ga. sheet brass	3¼ x 8 in.
1	Film pack		

Suggested Procedure

1. With a sharp pencil make the layout for the photo stand as shown in Figure 4. This layout should be made directly on the metal. The pencil is recommended rather than a scriber, because scriber marks left on the metal would be undesirable in the finished project. Pencil marks will be difficult to see, but should be sufficiently plain for this simple layout.

2. Cut the metal to the shape shown and carefully round all corners.

Fig. 3. Sheet metal cut and bent to support the film pack

3. Form the metal for the base of the stand by rolling it around a ¼-in. rod. It is recommended that one side at a time be rolled. Do not use pliers unless a pair with teeth ground off is available and, even with these, care must be taken not to mar the metal. A vise may be used, if the metal is protected with wood or fiber covered vise plates.

4. Bend the long tongue of the holder as shown in Figure 3. This should be adjusted to hold the pack securely.

Alternatives

Use planished aluminum or brass for the holder.

The bottom of the base may be covered with felt.

The entire project may be given a crystallizing enamel finish.

Two or more packs may be soldered together and a base designed to hold them.

A piece of glass or clear plastic may be inserted in the pack as a cover for the photograph.

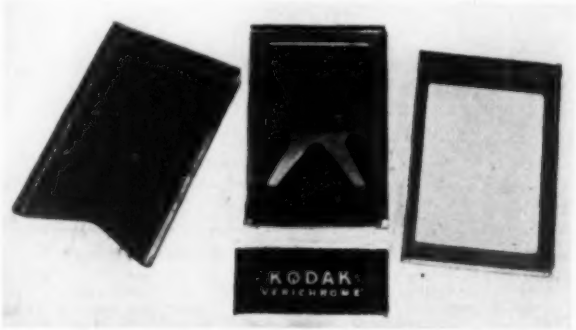


Fig. 2. Disassembled film pack

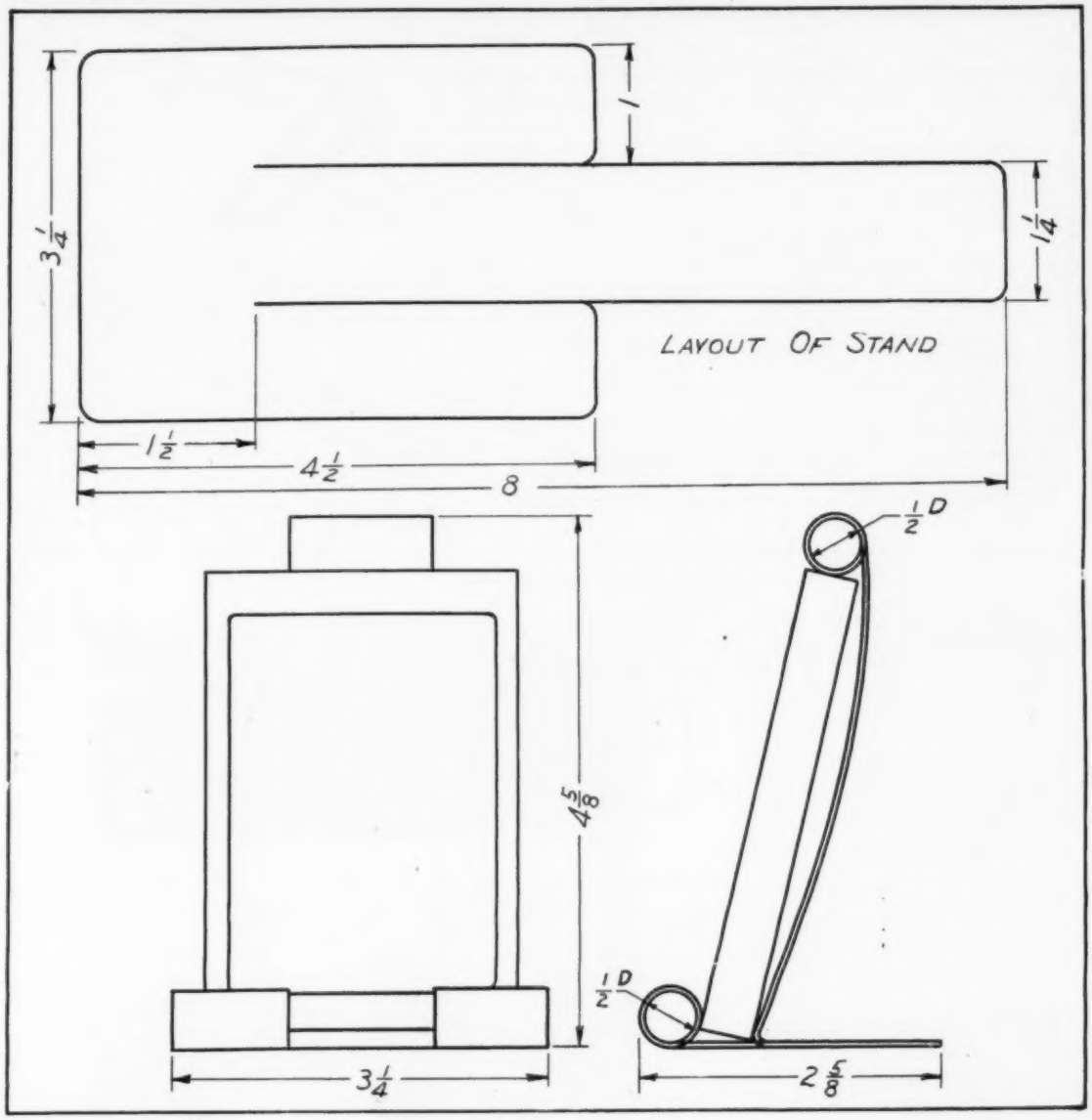


Fig. 4. Details of stand and photo holder

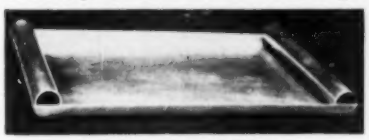
ALUMINUM BREAD TRAY

SIMON S. PALESTRANT

Bronx, N. Y.

A constant necessity for a complete table spread is the bread tray. A fine looking one more than enhances the decor, because it affords gustatory pleasure as well. Among the vast group of surplus materials available is the light though tough aluminum alloy, duraluminum. This can be obtained in a variety of gauges from the 1/32 to ¼ in. or better in thickness.

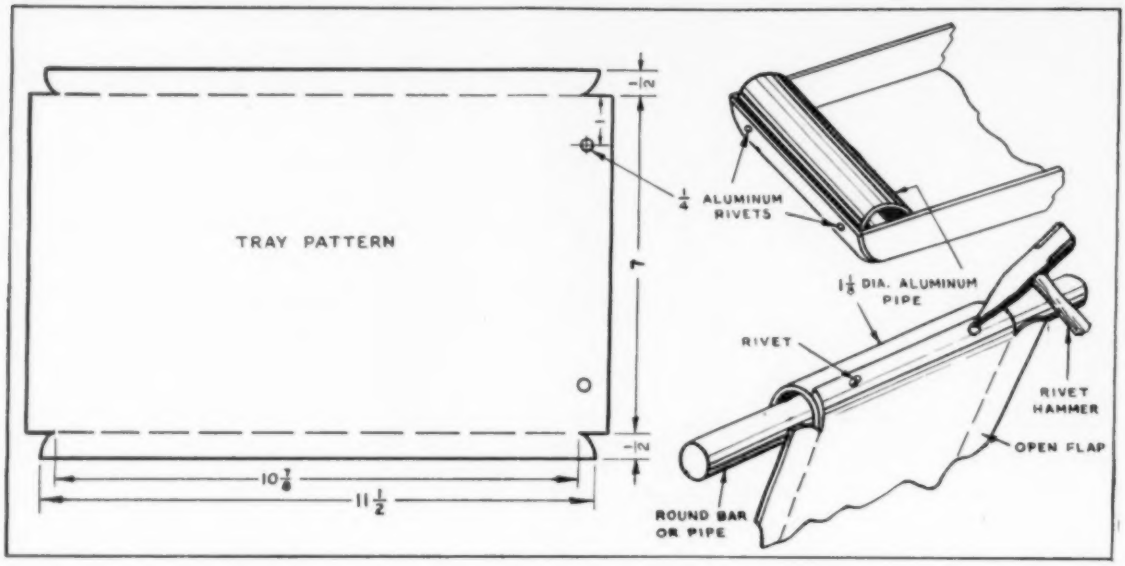
Using ⅛-in. thick stock, cut out the pattern of the tray. Because of its tremendous toughness, it will probably require the use of compound lever shears, a hack saw or a jeweler's saw.



Aluminum bread tray

When the material is cut to shape, it should be filed and smoothed to perfection. Drill two ⅛-in. holes through both end flaps of the tray, 1 in. from each end. Line these up with two holes you will drill into one wall of each of the aluminum tubes.

Bend these flaps over a round rod mandrel so that they fit each of these aluminum tubes. Place the rivets into these matched holes so



Aluminum bread tray

that the heads are in the inside of the tube. Set these rivets tightly in place. It is well to use a steel bar or pipe, slipped into the hollow of the tube as an anvil.

Bend the sides up to a 90-deg angle so that the ends meet the outside curvature of the tube in a perfect joint.

Remove all hammer marks, polish and buff the job to a high luster, and you have a clever, though simple bread tray designed to fit both modern or traditional home decorations.

BILL OF MATERIAL

No. of pcs.	*Name*	*Material*	*Size*
1		⅛-in. stock duraluminum	11½ x 8
2	Tubes	1/16-in. wall aluminum	7 x 1⅛ dia.
4	Rivets (Flathead)		⅛ x ¼

BEACH PAIL AND SHOVEL

VINCENT P. CONNERS

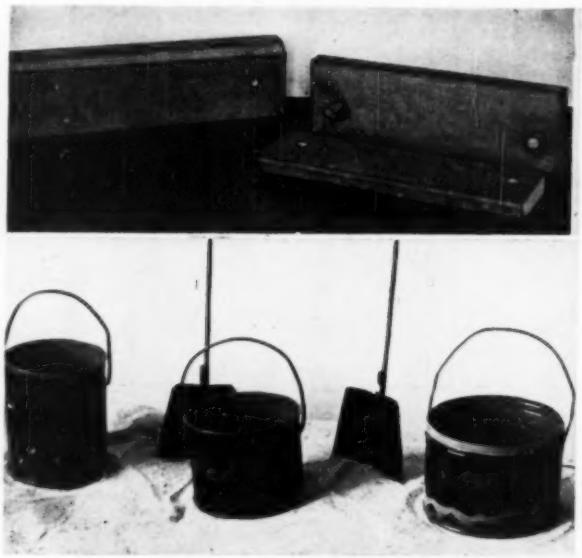
Supervisor of Handicrafts

Special Class Department

Boston, Mass.

The period that we have passed through, and even our present period, has, from necessity alone, established tin can work as a major craft. As metal will be hard to get for some time and when available it will be too highly priced for most school boards, we who must initiate purposeful programs look hopefully to this medium.

The history of tin, its place in our present-day mode of living, and our reliance upon it in all of our industrial plans for the future offer unlimited opportunity for our related work.



At the top is shown the bending jig. The pail and shovel are shown at the bottom

Beach Pail

Materials: large clean tin can, old light-weight wire coat hanger, paint, brushes.

Tools: hammer, nail, pliers, can opener.

Procedure:

1. Select a large tin can (any size up to a gallon).

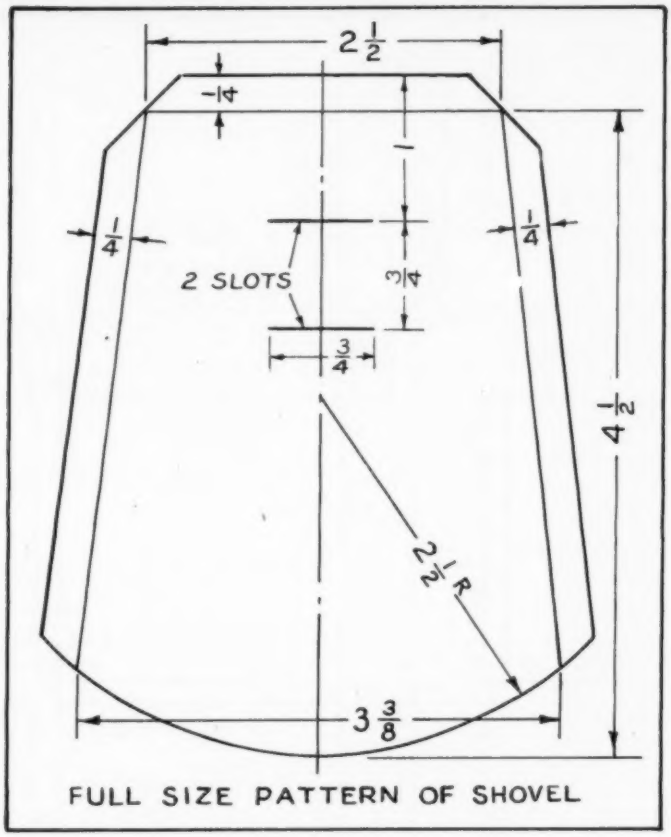
2. Remove cover so that top edge is free of all roughness that might cause cutting of fingers.

3. Wash can thoroughly.

4. Three quarters of an inch down from the top punch two holes, one opposite the other.

5. Straighten out an old coat hanger.

6. Shape handle from this wire and leave



Shovel

on each end enough wire to turn in for fastening.

7. Tighten handle.

The Bending Jig

Before making the shovel, it is necessary to have a bending jig suitable for the classroom or hobby room. As time goes on, you will want to make three or four of these, all of different dimensions, so that work of any size can eventually be taken care of.

Materials: ½-in. dowel, glue, piece of 1-in. maple 11 in. long.

Tools: Ripsaw, backsaw, plane, ½-in. bit, bit brace.

Procedure:

1. Using the standard woodwork rules for squaring up a piece of stock, cut two pieces 1 by 4 by 10 in.

2. On one piece locate centers for the dowels 1 in. in from each end and 2 in. down from the top.

3. Clamp both pieces together, and with the ½-in. bit, bore a hole through the top piece, and ⅔ of the way through the bottom piece.

4. Cut a piece of ½-in. dowel so that it will go through the top piece, and glue it into the hole in the lower piece.

5. When dry, this will permit the two boards to be separated and at the same time they may be replaced easily.

6. For bending or folding, the boards may be loosened to permit metal to be put in between. Then they are clamped in the vise and the metal is bent to any angle up to 90 deg.

7. This particular jig will take metal up to 10 in. in length. Others may be made to take care of longer pieces.

Making the Beach Shovel

A beach pail is of little use unless it is accompanied by a beach shovel. The shovel is a simple, yet most interesting project.

Materials: One piece of scrap tin, a piece of ⅜-in. dowel 10 in. long, one ⅝-in. f.h. nail, paint, brushes.

Tools: Snips, cold chisel, backsaw, hammer, pliers.

Procedure:

1. Lay off pattern as shown in illustration.

2. Cut to lines with snips.

3. By means of bending jig, fold back the three hems and hammer them down tight with a mallet.

4. Cut two slots in this piece of metal on the lines shown in sketch.

5. Force down the metal that is in between these two cuts.

6. Saw the dowel from one end, down through the center about two inches.

7. Slide the dowel on, so that half of the wood goes above the tin section (that has just been forced down) and half below.

8. Now hammer a ⅝-in. f.h. nail through the dowel and the tin.

9. Paint the shovel to harmonize with the colors on the beach pail.

This combined project introduces a very purposeful unit in the field of tin-can craft and one that can be promoted to the point of supporting other parts of handwork programs. Beach pails and shovels may be made by the production method for Christmas or early spring sales. This will bring some revenue into the shop that had not been anticipated by instructor or pupil.

TYPEWRITER TABLE

C. F. ZAENGLEIN
High School
Circleville, Ohio

Since the typewriter has become a permanent fixture in the home, school, and office, it is necessary to have a suitable table which is light, sturdy, and strong.

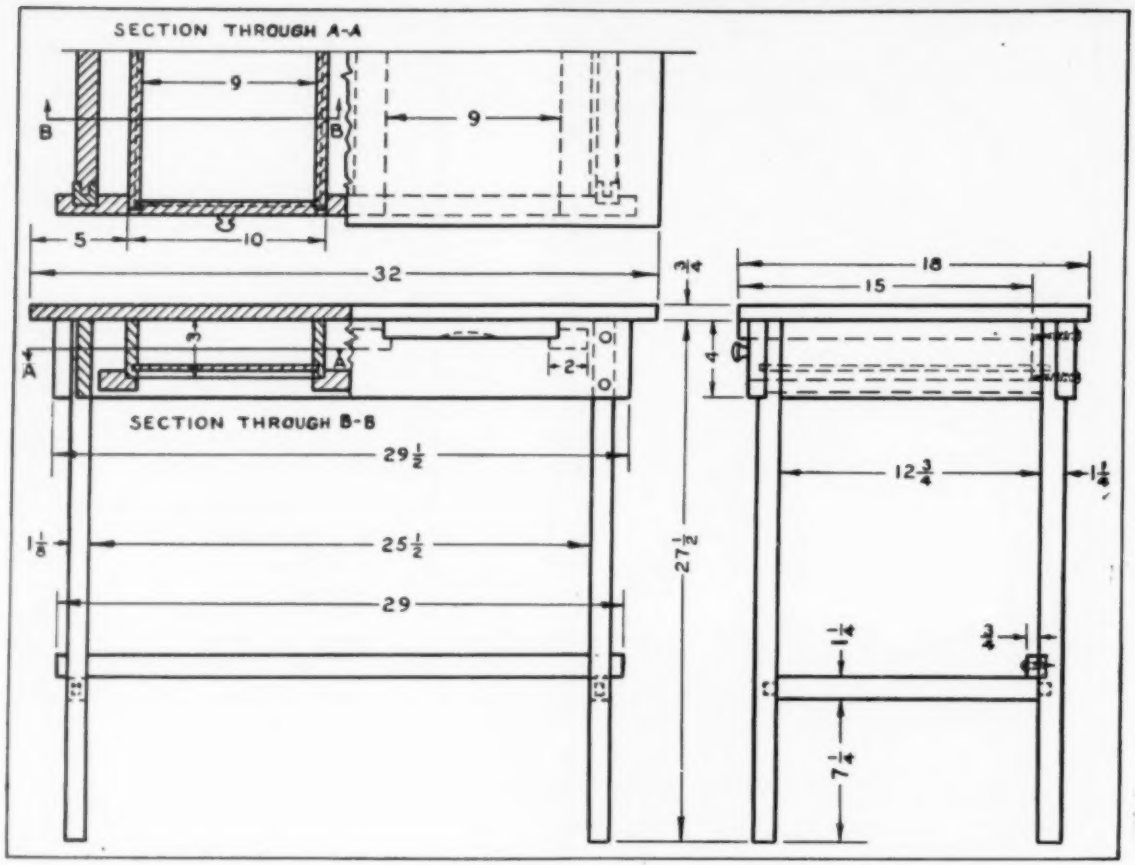
Our woodworking department has constructed a large number of such tables for the commercial department and they have stood the test for many years.

The table proved to be very satisfactory, and it was found that many students taking shopwork desired to build a similar table for use in their homes. It can be used for many purposes, such as: boys' study table, utility table in the home, and a typing table.

The table is simple to construct and it makes a practical problem for the junior or senior high school woodworking class, either on a factory production basis or as an individual project. The table can be constructed with hand tools or machines.

There are few mortise and tenon joints in this design and it does not hinder its strength or appearance.

Typewriter table



Typewriter table

BILL OF MATERIAL

TABLE

No. of Pcs.	Name	Size
4	Legs	1⅛ x 1¼ x 27½
1	Stretcher	1⅛ x 1¼ x 29
1	Top	¾ x 18 x 32
2	Sides	1 x 4 x 29½
2	Ends	1 x 4 x 14½
2	Sides	½ x 3 x 14
2	Front and end	½ x 3 x 10
1	3-ply	¼ x 10 x 14
1	Slide	¾ x 9 x 15
4	Drawer and slide runners	1 x 1½ x 12¾
10	R.H. screws	No. 12 x 1¼ in.

The ends of the table should be constructed first, using regular mortise and tenon joints.

Gained joints are then laid off and cut out in the long rails as shown. These joints should fit tight because the strength of the tables will depend largely on the gained joints.

It is important that the legs be scraped and sanded before the gained joints are cut out and each joint should be cut out separately according to the thickness of the leg.

Hardwood and a good varnish should be used.

EDUCATIONAL ELECTRONICS

JOHN N. WILLMOTT
ROBERT L. WHITTLE
and THOMAS D. MINER
Public Schools
Garden City, N. Y.

Unit No. 1 — The Power Supply

Check the following items in your kit:

1 — power transformer No. P6297 Stancor
1 — 5Y3 vacuum tube
1 — tube socket, wafer, laminated fiber, std. size
4 — spacers, ¾ by ¼ in.
1 — filter choke No. C1708 or C1003 Stancor
6 — r.h.b. wood screws, ½ in. No. 6
1 — all-purpose electrical neon tester
8 — 8mfd./450 w.v. — common negative
1 — dry electrolytic condenser
1 — male plug No. 61M1 Amphenol with mounting plate
4 — r.h.b. wood screws, 1¼ by No. 6
10 — studs, "Nu-Way"
1 — connecting wire — Belden*
13 — snap fasteners, "Nu-Way"
1-ft. hook-up wire for tube socket

*100 ft. Belden black test lead wire, type 8899.

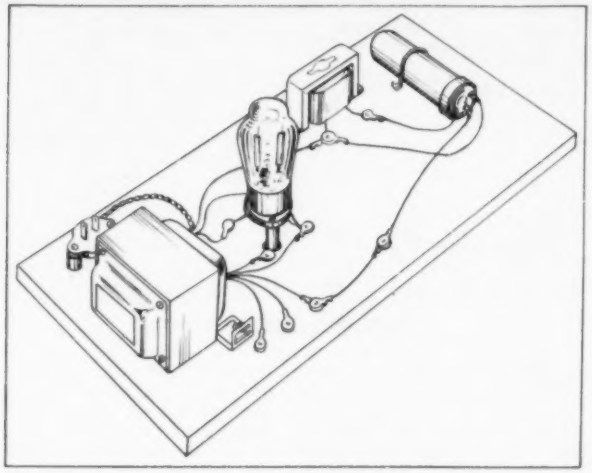
How to Build the Power Supply

Read through before starting work.

1. Select a piece of wood 8 by 15 in., and at least ⅜ in. thick. (⅜-in. fir plywood is suitable.) Square, sand, and finish. Two coats of orange shellac rubbed with No. 3/0 steel wool is satisfactory.

2. Fasten the *drilling schedule* to the top of the board with tacks or tape. Referring to the *parts placement diagram*, place all the parts in their proper position and check to see if the holes line up with those on the drilling schedule. The brackets with the transformer should be mounted under two of the transformer frame screws before placing in position to locate holes. Due to stencil and paper inaccuracies some of the holes may be slightly out of place. If so, take an awl and locate the holes correctly. Using the drill sizes indicated on the schedule, drill through the board exactly as shown. Discard the paper drilling schedule.

3. Fasten the parts in place on the board



Power-supply unit

using wood screws as shown in the parts placement diagram. Before mounting tube socket, bend lugs outward and solder 2-in. piece of hook-up wire to the four lugs shown in wiring diagram. The tube socket should be mounted with the No. 6 by 1¼-in. wood screws passing through the spacers provided. These spacers, or *standoffs* are for the purpose of holding the socket and its connecting wires away from the board. Be sure that the socket is in position so that the keyway in its center hole is located as shown in the diagram. The plug, with the prongs upward, should be connected to the black transformer leads. It should be mounted on spacers the same as the socket.

4. In an envelope you will find ten studs. These are screws with ball-shaped ends and hexagonal head below the ball end. Remove the nuts and screw the studs in places indicated on diagram. A hexagonal socket wrench to fit ¼ in. nuts such as the "Spintite" will make the job of tightening the screw studs easy. Do not tighten completely at this time, but leave enough clearance to draw wire under the head.

5. Refer now to the wiring diagram. Connect the wires from the choke, and from the tube socket, and the green wires from the transformer to the proper studs by twisting them around the screw (clockwise) under the hexagonal head. After the wires have been connected to the proper studs, the studs should be tightened in the board. Solder snap fasteners to the ends of all leads as shown. Do not bend down lugs of snap fasteners on the wire before soldering. Cut off excess wire before soldering on snap fasteners, but do not cut wire so short that leads have to be stretched tight to fasten to proper studs. Connect any other wires as shown in the diagram. The leads have snap fasteners at each end and are connected by pressing down on the ball of the studs.

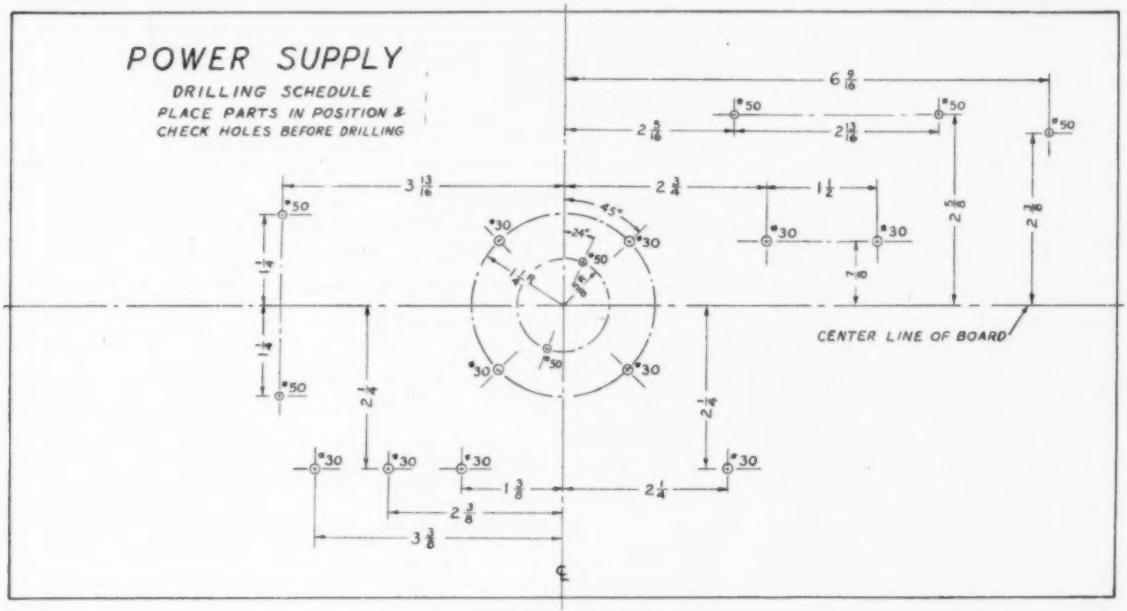
6. The leads on the condenser, and the remaining wires from the transformer should be connected to the proper studs by pressing the snap fasteners down onto the ball end of the stud. Be sure to make all connections exactly as shown in the wiring diagram, paying careful attention to the colors indicated.

WARNING: *If the dry electrolytic condenser is not connected as shown (positive-plus and negative-minus) it may be destroyed.*

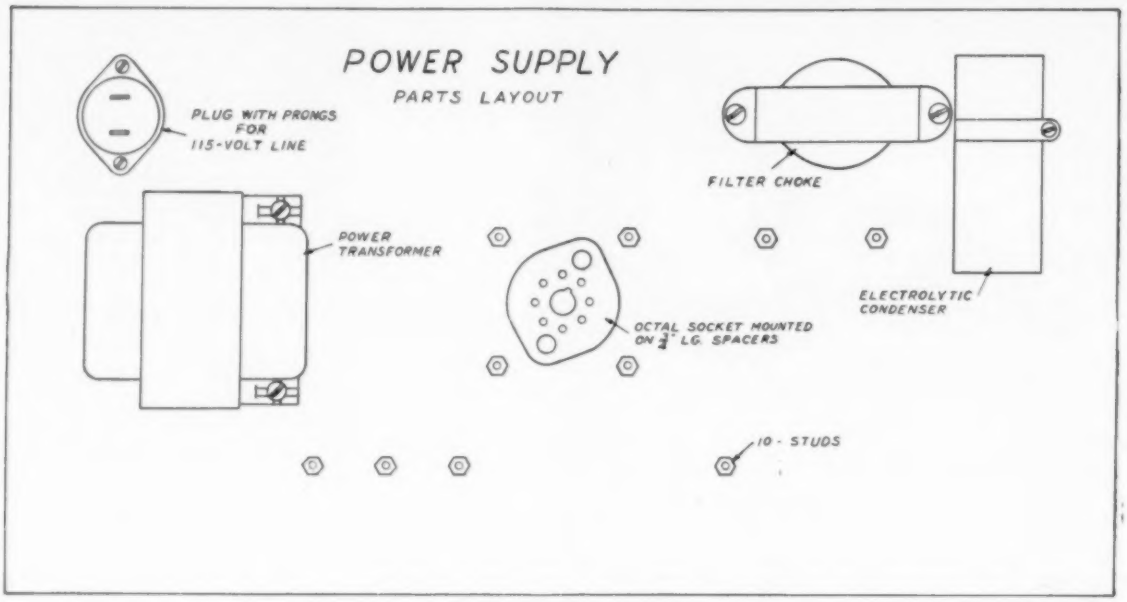
7. Place the tube (5Y3) in the socket. NOTE: That the key on the center cylindrical stem of the tube base fits the keyway in the socket.

How to Test the Power Supply

CAUTION: Before plugging the power cord into an outlet, check all connections with the wiring diagram, and check the voltage and frequency of the power line you are going to plug in on. *This power supply can only be used on 50–60 cycles, 110–120 volt a.c.*



Drilling schedule



Parts placement diagram

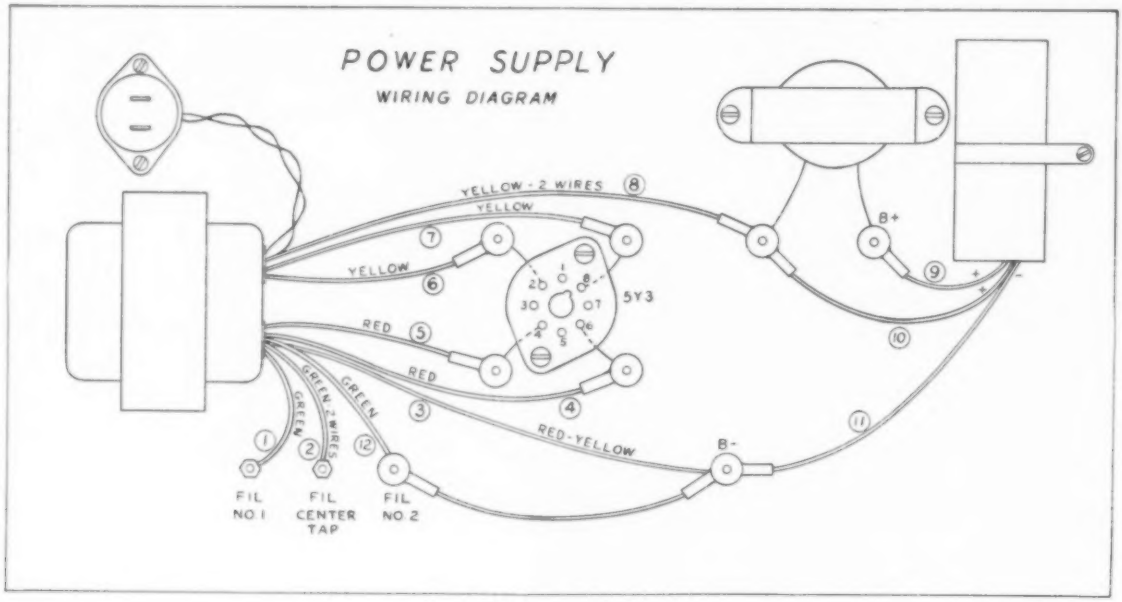
To guard against shocks observe the following rules.

1. Always disconnect the power supply from the 110-volt power line before making adjustments.

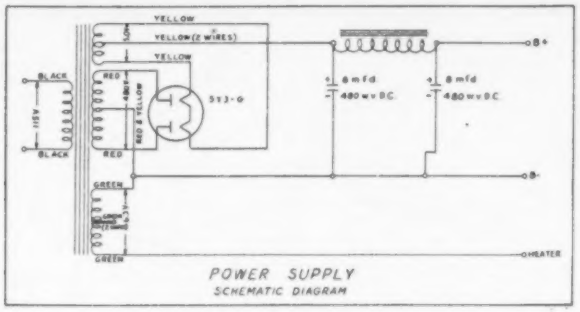
2. Always work with one hand — never with both.

3. When the condenser is connected in the circuit touch the bare ends of a piece of insulated wire to its terminals after turning the power supply off.

4. A neon tester is a convenient and inexpensive device with which to check the operation of your power supply. Such a tester, with flexible leads attached, can be obtained in most hardware stores, or from any electrical or radio dealer. It can be used just as supplied, but will be more convenient if spring clips are soldered to its leads, so that it can be connected in place before turning on the power. After plugging the power cord into the proper



Wiring diagram



Schematic wiring diagram

outlet, the rectifier tube should light up quickly. Then touch one lead from the neon tester to the lug labeled B— on the wiring diagram, and the other lead to the lug marked B+. *One* plate of the tester should glow brightly. This indicates that the high d.c. voltage necessary for operating electronic devices is being properly supplied.

5. If a d.c. voltmeter is available, read the voltage between B+ and B—. It should be about 300 volts.

6. If an a.c. voltmeter is available, check the voltage between the lug marked *heater, and B—*. It should be about 6.5 volts.

The power supply is then ready to use.

How Does a Power Supply Work?

(Reference — *Elements of Radio*, Marcus and Horton — Chaps. 14, 18, and 19.)

NOTE: Power Supply diagrams in Chapter 18 show the choke on the negative side, whereas our diagram shows the choke on the positive side. See paragraph 3 of Section 124 for an explanation.

A power supply such as you have just built is used to supply the proper voltages to operate the vacuum tubes of various electronic devices. Most vacuum tubes require a low voltage (often 6.3 volts a.c. or d.c.) to heat their cathodes to a temperature high enough to make them emit electrons. The glow that you see in a tube when it is turned on is due to the high temperature of the cathode. Tubes also require a high voltage (usually 100 to 300 volts) which must be pure direct current. Since the usual power line supplies 110 volts *a.c.*, the power supply must be used to change this to the high d.c. voltage, and to the low a.c. needed by the tube heaters. The following experiments will help you understand how the power supply accomplishes this.

Experiment No. 1 — The Transformer

(Reference — Marcus and Horton — Sections 57, 58, 119, and 120.)

CAUTION: Although voltages such as are developed in this power supply are not dangerous, shocks are very unpleasant. Therefore, follow these three rules:

1. Always disconnect the power supply from the 110-volt power line before making any adjustments.

2. Always work with just one hand — never with both.

3. When the condenser is connected in the circuit, touch the bare ends of a piece of insulated wire to its terminals after turning the power supply off.

NOTE: While you are making the various tests in these experiments, you should keep the schematic diagram of the power supply open before you and refer to it as you make each connection. As you make each observation, record it in your notebook, rather than trying to remember results until you start to write up the experiment.

1. Use the neon tester, previously used to test the power supply, to help you study the transformer. Attach power cord to 110-volt line. Before connecting to power supply, thrust tester probes into power cord socket and notice the way the tester glows. If both of its elements glow, then you are in contact with alternating current. When this tester is used with direct current, only the element connected to the *negative* terminal will glow.

2. While it is still connected to the power cord socket, move it quickly through a 3- or 4-inch arc. Does it appear to glow steadily, or is it really going on and off very quickly? *Why does this happen?*

3. Notice particularly how bright it is. The higher the voltage, the more brightly it will glow. Since you know that this is 110 volts, you can use this as a reference to help you tell approximately what other voltages are.

4. With the power supply plugged in, connect the tester to the two yellow wires which are attached to the tube socket. NOTE: The tester will not glow at all on any voltage lower than about 70 volts. What does this result indicate about the voltage supplied to the rectifier filament? Read section 120 in Marcus and Horton for the explanation.

5. Connect one contact of the tester to one of the red wires going to the tube socket, and the other to the red and yellow wire attached to B—. Refer to the schematic diagram, and you will see that this puts the tester across *half* of the transformer secondary. What do you notice about the nature of the voltage? Is it a higher, or a lower voltage than that coming from the power line?

6. Now connect the tester from one red wire to the other. Look at the schematic diagram, and tell what part of the transformer you are now testing. How does this voltage compare with the results you got in steps 3 and 5?

Record Your Results This Way:

1. First describe your results in each of the six steps of the experiment, using whatever form your instructor prefers. Be sure to answer all the questions.

2. Write the answers to these questions after reading the references in Marcus and Horton:

a) Describe the structure of a transformer, and draw a diagram of it.

b) What is the main purpose of a transformer?

c) What is a step-up transformer, and how is it constructed?

d) What is a step-down transformer, and how is it constructed?

Experiment No. 2 — The Rectifier Tube

(Reference — Marcus and Horton — Sections 81, 82, 117, 121.)

1. Remove the tube from its socket, and examine it closely. Each of the two separate units is called a diode. The dark, oval cylinders are the plates. Are the plates connected together? The flat ribbons of wire running up inside the plates are the cathodes. Are the cathodes connected together?

2. Replace the tube in its socket, and turn on the power supply. What part of the tube glows? Why is it necessary for this part of the tube to be hot?

3. Disconnect the condenser and one of the red wires which go to the tube socket, and turn on the power supply. Connect your neon tester to B—, and to the double yellow wire coming from the transformer. *Consult the schematic diagram to see exactly what the tester is connected to.* Are you using one of the diodes, or both? Is this voltage a.ç. or d.c.? How does the size of the voltage appear to compare with that of the 110 v. line? Move the tester quickly through a short arc. Is the voltage steady? Try to notice and remember how this looks. Read in the reference about "Half-wave Rectification."

4. Reconnect the red wire to the tube socket, so that the circuit is complete except for the condenser. Refer to the schematic diagram and decide exactly how you have changed the circuit. Turn the power on again. Repeat the observations of step No. 3, and answer the same questions. Try in particular to notice the difference between these two steps when you move the tester quickly. You may need to disconnect the red wire again in order to compare results. Read about "full-wave rectification."

Report

1. Describe what you observed in each of the steps of this experiment, answering all the questions.

2. Tell the function of each of these parts of a diode: cathode, plate, glass envelope, base.

3. What is the purpose of a rectifier tube?

4. Draw a schematic diagram of a half-wave rectifier. Draw a graph of normal a.c. voltage, and beside it draw a graph of the voltage from a half-wave rectifier.

5. Draw a schematic diagram of a full wave rectifier. Draw a graph of normal a.c. voltage,

and beside it, a graph of the voltage from a full-wave rectifier.

6. Why does the transformer secondary have a center tap?

Experiment No. 3 — How the Condensers Work

(Reference — Marcus and Horton, Sections 29, 66, 67, 125.)

1. Connect the bare end of a 6-in. piece of insulated wire to B—, and let the other end from which the insulation has been removed, hang free. You will use this as a shorting wire in parts of this and the next experiment, and also to discharge the condensers after they have been used in the circuit.

2. Disconnect the yellow wire which leads from the transformer to the choke, connect the neon tester to it, and to B—, and turn on the power supply. Describe this voltage as to size, polarity (the negative element of the tester glows), and nature (a.c., d.c., or pulsating d.c.). When you turn off the power supply, does the tester continue to glow, or does it go out immediately?

3. Connect one of the *center or positive elements* of the condenser to this yellow wire. Be sure that the *outside or negative terminal* of the condenser is connected to B—. Repeat step No. 2, describing the voltage completely. Watch the neon tester closely as you turn off the power supply. With a watch, or by counting seconds, time the continued glow in the tester until it finally goes out. Repeat this several times, until you are sure that you understand what is happening. When you are through, touch your ground wire to the condenser lead before you start to change the circuit.

4. Connect the other *center terminal* of the condenser to the one used in the last step, so that the two halves of the dual condenser are connected in parallel. Repeat step No. 3, paying particular attention to the timing of the condenser's discharge. What difference do you note between these results? Again use your shorting wire before touching the circuit.

5. Disconnect the neon tester and the condenser, so that the circuit is as it was in step No. 2. Turn on the power supply, and momentarily touch the shorting wire to the yellow wire from the transformer. Describe the spark.

CAUTION: Do not let the wire remain in contact for more than a fraction of a second, or you may damage the power supply.

6. Repeat step No. 5 with the first condenser connected, and then both. Each time notice the spark produced.

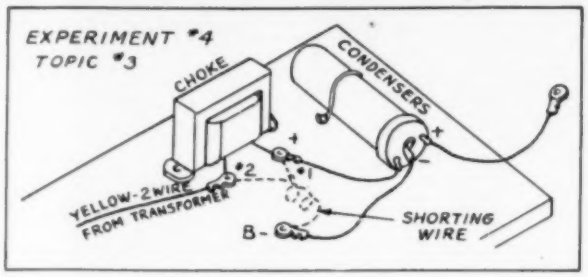
7. With both condensers connected, turn the power supply off, and wait about thirty seconds before using the shorting wire. Why is the spark smaller?

Report

1. Describe completely what happened in each step of the experiment.

2. What are three necessary parts of any condenser?

3. Tell what happens in terms of electron flow when a condenser is charged.



Studying the condenser and the choke

4. Tell what is meant by discharging the condenser.

5. Explain the difference obtained when both condensers were used rather than just one as in step No. 4.

6. What is an electrolytic condenser?

7. Copy the ratings on these condensers, as marked on the side of the can, in both volts and microfarads. What is the importance of each of these ratings?

8. What is meant by *leakage* in an electrolytic condenser? (See the results of step No. 7.)

Experiment No. 4 — How the Choke or Inductance Works

(Reference — Marcus and Horton, Sections 28, 69, 70.)

1. For this experiment you will need a flashlight battery or dry cell as well as the equipment used in the previous experiments. Connect the neon tester across the battery. What is the result? What is the voltage produced by a dry cell?

2. Now disconnect the filter choke from the power supply circuit, and connect the neon tester across it. Connect a wire from one side of the choke to the battery. Then bring another wire from the other side of the choke into contact with the other terminal of the battery. Watch the neon tester as you make and break this contact. What does this prove about the voltage across the choke? When, exactly, does the tester flash? Remember that the negative terminal of the tester is the one which lights up, and that the center terminal of the dry cell is positive. In which direction is this voltage appearing at the tester, with respect to the dry cell? Put two fingers of one hand in contact with the terminals of the choke, and feel the slight shock when contact with the dry cell is broken. Read about self-induction in sections 69 and 70 of Marcus and Horton.

3. Disconnect the dry cell and tester from the choke, and connect one positive terminal of the condenser to one side of the choke, the negative terminal of B—, and the yellow wire from the transformer to the other side of the choke. Turn on the power supply, and leave it on for a few seconds, until the condenser is charged. Turn the power supply off, and discharge the condenser with your shorting wire (one side of which is connected to B—) by touching it directly to the condenser terminal. Notice the nature of the spark. Repeat, but this time touch the shorting wire to the side of the choke opposite the condenser, and look closely for the spark. In which case is the discharge more sudden and sharp? When the discharge is through the choke, does it seem as if the choke is resisting this sudden surge of current through it?

4. Connect the complete power supply, as shown in the wiring diagram. Attach the neon tester from B— to B+, and describe the voltage — amount, nature, and polarity.

Report

1. Describe exactly what happened in each of the steps of the experiment, and answer all the questions.

2. Describe the construction of an inductor.

3. What is the unit used to measure inductance?

4. What factors does the inductance of a coil depend on?

5. What is meant by *self-inductance?*

6. Explain the results you got in step No. 2.

7. Draw a circuit diagram of a filter, such as the one in our power supply. Draw a graph of the voltage coming into it from the full wave rectifier, and show by graph what the filter does to it.

8. Draw a schematic diagram of the complete power supply. (Note the difference in placement of choke in your power supply and diagrams in text.) Read third paragraph, Section 124 for explanation. Trace the filament circuit; plate circuit; primary circuit.

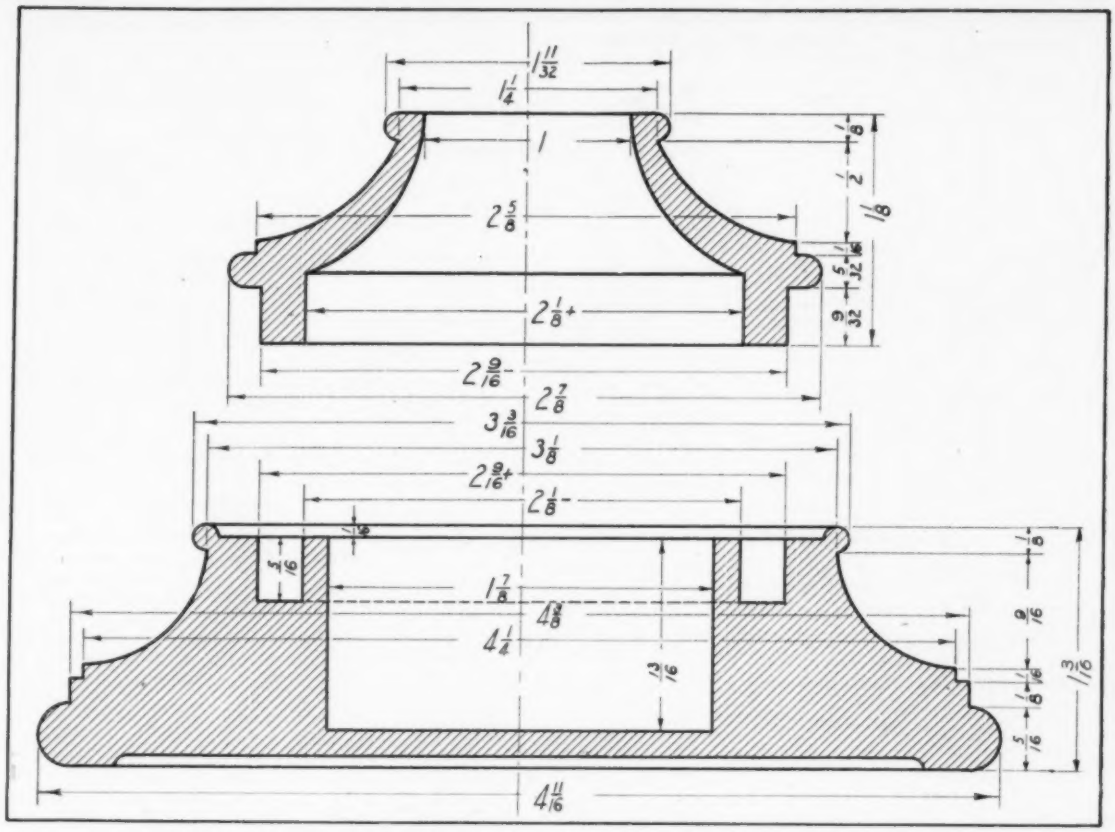
(To be continued)

TURNED INK-BOTTLE HOLDER

J. H. McCloskey
Director of Technical Work
Lakewood, Ohio

The turned ink stand to hold a bottle of drawing ink was one of the required problems in the course of wood turning taught by Professor Charles Weich at Teachers College of Columbia University early in the century. It is a problem requiring chucking and rechucking and will tax the ability of above average pupils who have had considerable experience in wood turning.

Well-seasoned maple is probably the best of the native woods for this job.



Turned ink-bottle holder. Submitted by J. H. McCloskey, director of technical work, Lakewood, Ohio

TRICYCLE

M. J. RULEY
Director, Industrial Arts and Vocational Education
Tulsa, Okla.

A sturdy tricycle of birch, maple, or poplar is very serviceable for small children two to four years of age. Variations from the drawing might be made by turning a design on the face of the wheels. The tricycles were finished with clear lacquer, but may be finished in color if desired.

BILL OF MATERIAL

No. of pcs.	*Name of part*	*Size*
1	Body	1⅜ x 17⅛ x 17⅜
1	Steering post	1⅜ x 1⅞ x 7½
1	Fork	1⅜ x 1⅞ x 9⅜
1	Seat base	1⅜ x 2¾ x 5
1	Seat	¾ x 5¼ x 9
2	Back wheels	¾ x 6 dia.
1	Front wheel	¾ x 7¾ dia.
2	Pedal arms	13/16 x 1½ x 3
1	Back axle	⅞ x 14 dowel
1	Handle bar	⅝ x 8½ dowel
1	Steering pin	⅞ x 4⅞ dowel
1	Front axle	¾ x 4¾ dowel
2	Pedals	⅝ x 3¾ dowel
4	Wood screws	No. 8 x 1½ f.h.
4	Cotter pins	5/32 x 1½
2	Washers	1-in. hole

Procedure

Body

1. Get out material.
2. Lay out body.
3. Cut to size.
4. Lay out for holes.
5. Drill ⅞-in. hole for axle.
6. Drill 15/16-in. hole for steering pin.
7. Plane four sides.
8. Finish back edge ½-in. radius.
9. Sand.

Steering Post

1. Lay out for steering post and fork.
2. Cut to size.
3. Lay out for holes.
4. Drill ⅝-in. hole for handle bar.
5. Drill ⅞-in. hole in end for steering pin (deep).
6. Plane four sides.
7. Chamfer top end 3/16 in.
8. Sand.

Fork

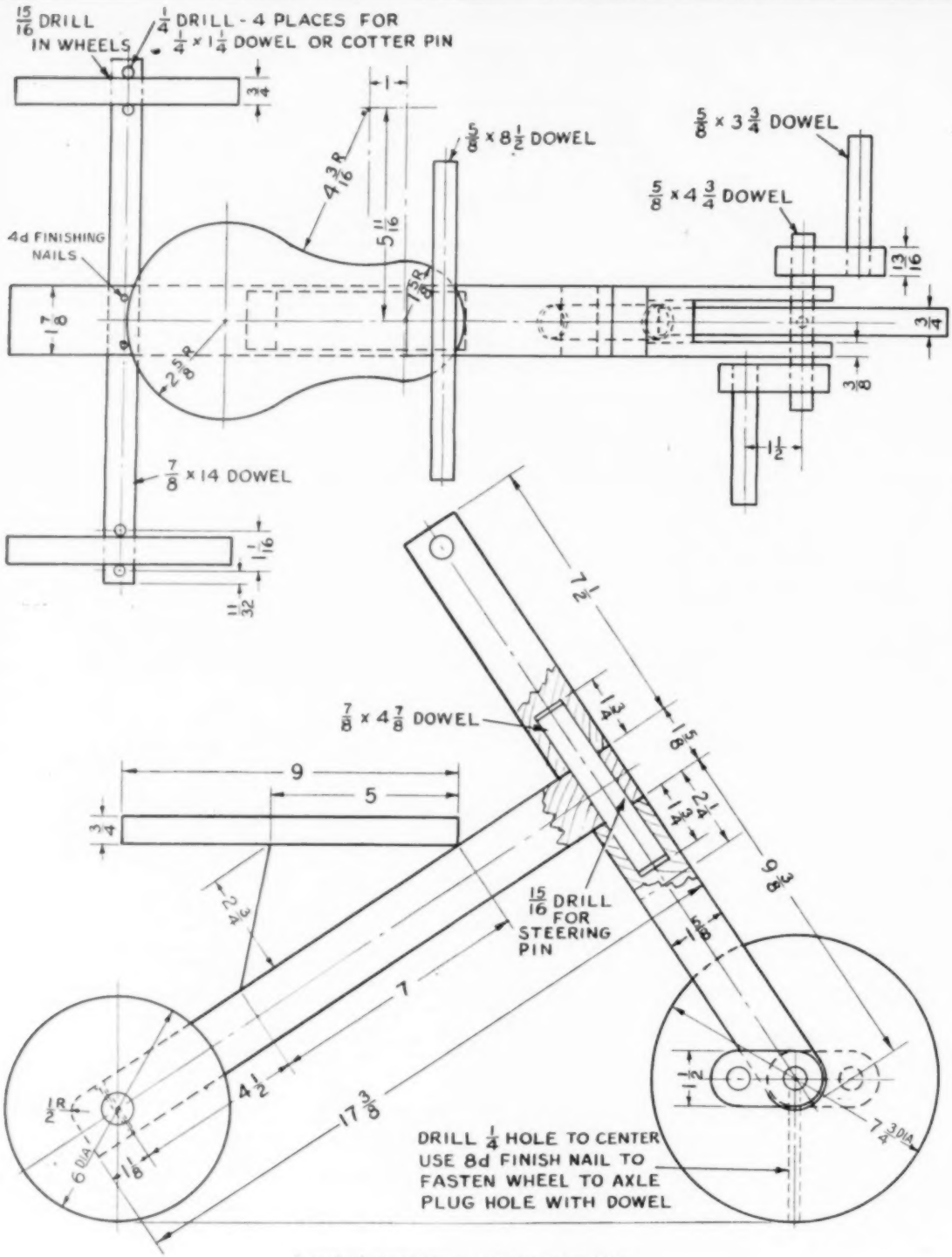
1. Lay out for fork.
2. Cut to size.
3. Lay out for holes and fork.
4. Drill ⅞-in. hole in end for steering pin (deep).
5. Drill 13/16 in. hole for axle.
6. Drill 1-in. hole for fork.
7. Saw out line to drilled hole.
8. Round fork end to half radius.
9. Plane four sides.
10. Sand.

Front Wheel

1. Get out material.
2. Lay out to size.
3. Cut out with band saw or fly cutter, or turn on lathe.
4. Shape wheel as desired.
5. Sand.
6. Drill ¾-in. hole for axle.
7. Drill ¼-in. hole for fastening.
8. Wheel to axle.

Back Wheels

1. Get out material.
2. Lay out to size.


15/16 DRILL IN WHEELS
1/4 DRILL - 4 PLACES FOR 1/4 x 1 1/4 DOWEL OR COTTER PIN
5/8 x 8 1/2 DOWEL
5/8 x 3 3/4 DOWEL
5/8 x 4 3/4 DOWEL
4d FINISHING NAILS
7/8 x 14 DOWEL
7/8 x 4 7/8 DOWEL
15/16 DRILL FOR STEERING PIN
DRILL 1/4 HOLE TO CENTER
USE 8d FINISH NAIL TO
FASTEN WHEEL TO AXLE
PLUG HOLE WITH DOWEL

Tricycle designed by M. J. Ruley, Tulsa, Okla.

3. Cut out with band saw or fly cutter, or turn on lathe.
4. Shape wheels as desired.
5. Sand.
6. Drill 1-in. oversize hole for rear axle.

Seat

1. Get out material.
2. Lay out for seat base.
3. Cut to shape.
4. Plane.
5. Sand.
6. Lay out pattern for seat and holes.
7. Transfer pattern to material.
8. Cut out on band saw.
9. Smooth and shape edges.
10. Drill holes for screws.
11. Countersink.
12. Plane both sides.
13. Sand.

Assembly

1. Assemble handle bar and steering post.
2. Center and fasten with 4*d*. finish nail.
3. Center seat on seat post.
4. Drill pilot holes.
5. Fasten with flathead screws.
6. Assemble pedals and cranks with glue and 3*d*. finish nails.
7. Assemble front wheel, axle, washers, and crank assembly.
8. Check for clearance and free operation in fork.
9. Fasten crank assembly to axle with nail and glue.
10. Use 8*d*. finish nails to fasten wheel to axle.
11. Set nail with punch through ¼-in. hole.
12. Plug ¼-in. hole with dowel.
13. Assemble rear wheels.
14. Install cotter pins.
15. Center rear wheel axle and fasten with 4*d*. nails.
16. Check and finish sand.
17. Finish or paint as desired.
    Decals or stencil may be used on seat. Finishing with sealer and clear lacquer makes a nice looking job.

MODELED ASH TRAY

WILLIAM GALLIK

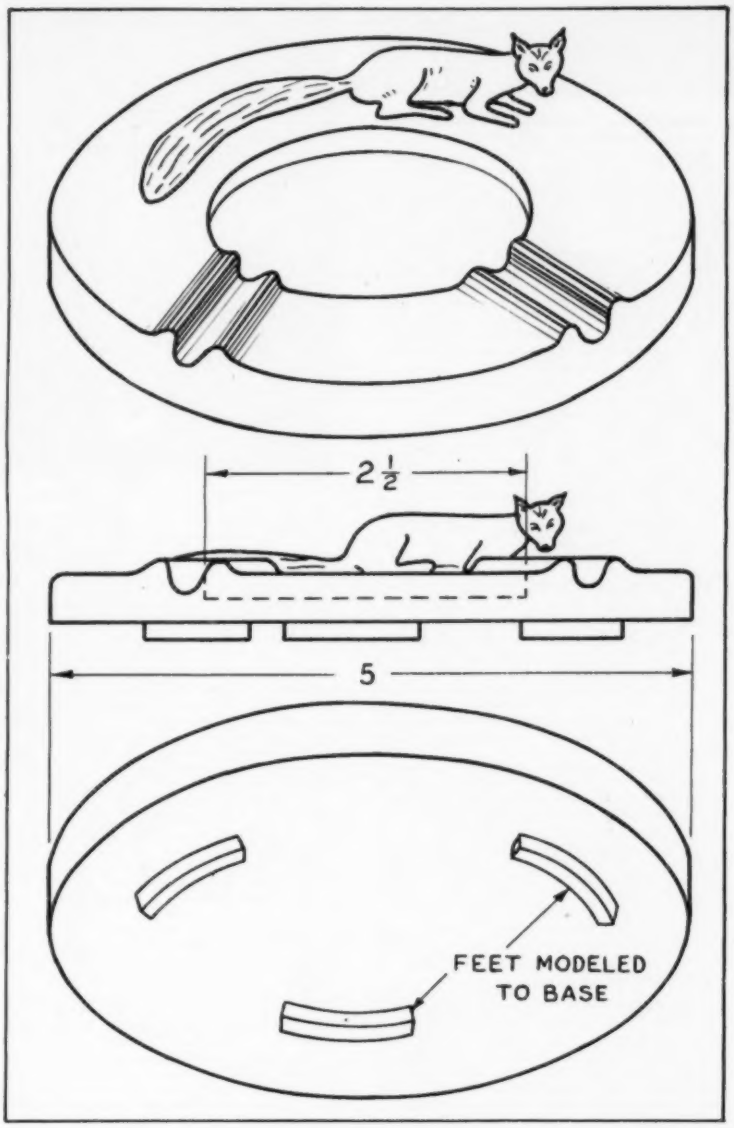
Oswego, N. Y.

The student commencing pottery work, as well as the more experienced pottery worker, will find this modeled ash tray an excellent project. Two methods of shaping clay, the slab and the built-up modeling methods, are used in producing this project.

First, *work* the clay well by kneading and wedging. For good modeling the clay should be soft enough to permit the fingers to be pushed into it easily, but not so soft that it will stick to the hands.

When the clay is at the proper consistency, roll out a slab on a cloth or paper towel with a rolling pin to a thickness of ⅜ in.

Cut a disk 5 in. in diameter from the slab. This may be done by cutting around a dish laid flat on the clay, or by cutting along a mark put into the clay with a compass. Then hollow out the central part to 2½-in. diameter, until the remainder is one half the thickness of the original clay.



Modeled ash tray

Next, model the fox or any other animal on the rim of the tray. This is done by pressing small lumps of clay down on the surface to build up the design. Take care to press the lumps down well as good welding will prevent cracking in the drying and bisque firing stages later. A knife and other simple modeling tools help in shaping the animal. The grooves for the cigarettes and the feet are put on last. These are also built up from the surface and shaped as desired.

When not working on the project, and for about a day after its completion, keep it in a damp, airtight container. This prevents hardening of the clay and equalizes the texture and water content. It can then be allowed to dry preferably on a wire screen until it is hard enough to be fired.

Association News

TENTH ANNUAL AMERICAN INDUSTRIAL ARTS ASSOCIATION CONVENTION

Hotel Jefferson at St. Louis, Mo., was the scene of the tenth annual meeting of the American Industrial Arts Association on May 12, 13, and 14, 1949. More than 200 registered. At the opening session on Thursday Dr. Walter R. Williams of the University of Florida, and president of A.I.A.A., was chairman.

The speakers were Carlton J. Gerbracht of Ohio State University; Hugh J. Butcher of Sutton, W. Va.; Dr. Joseph W. Giachino of Kalamazoo, Mich.; and Dr. John R. Ludington of the U. S. Office of Education. The subjects spoken on were certification, qualification, and accreditation. A lively discussion followed.

At the afternoon session, school-shop safety was discussed under the chairmanship of Prof. George B. Cox of Corvallis, Ore.

Dr. DeWitt Hunt, A. & M. College, Stillwater, Okla.; John M. Hurley, board of education, City of New York; Dr. Fred J. Schmidt, Jr., Muncie, Ind.; Wayne Hughes of the National Safety Council; and others gave excellent addresses on the subject.

At the evening meeting, Prof. Virgil Poling of Dartmouth College, Hanover, N. H., spoke on "Industrial Arts in Liberal Arts College Programs."

The subject for the Friday morning session was "School Shop Planning and Equipment Selection."

Dr. William E. Warner, Ohio State University; Prof. Elroy W. Bollinger of the New York State department of education; and others gave able presentations on this very vital topic.

Robert Stucker of the Brodhead-Garrett Co., of Cleveland, spoke on supply specifications, and the need for making out accurate and understandable orders.

Dr. John A. Whitesel of Miami University, Oxford, Ohio, was the chairman at the master teacher's session. On this program, Prof. Alfred F. Gross, Kingsville, Tex., gave a demonstration on "Design in Pottery and Other Media."

Wayne A. Wonacott, Los Angeles, Calif., followed with "Classroom Techniques in the Graphic Arts," and Prof. Raymond E. Matala of State Teachers College at Cedar Falls, Iowa, gave a demonstration of electronic devices.

J. Lyman Goldsmith, supervisor of junior high schools, Los Angeles, Calif., spoke on the techniques which are used in his school system to develop master teachers.

Dr. Louis V. Newkirk, Chicago, Ill., showed the technicolor film "Trained Hands" which he had made for his school system.

At 5:00 p.m. on Friday, under the chairmanship of Dr. Otto A. Hankammer, the Epsilon Pi Tau initiation team from Alpha Alpha chapter of the Kansas State Teachers College, Pittsburg, Kans., conducted a model initiation ceremony.

On Friday evening Commander I. K. Vandam described the Navy's educational program, which he directs for the Trust Territory of the Pacific. He had brought with him a large exhibit of arts and crafts made by Micronesian men and boys. The ship's program then followed.

At the Saturday morning session Dr. Lewis H. Caldwell of the Kansas State Teachers College, and Prof. Elroy W. Bollinger gave excellent talks on audio-visual teaching aids. Prof. Roland M. Torgerson of State University at Bowling Green, Ohio, presented a 111-page project which his students had assembled and published.

The officers elected for the coming year are: president, Dr. DeWitt Hunt, and vice-president, Dr. Otto A. Hankammer. D. Arthur Bricker continues as secretary-treasurer.

The next convention will be held at the Netherland-Plaza Hotel in Cincinnati, Ohio, on May 11, 12, and 13, 1950.

Epsilon Pi Tau initiation team at the A.I.A.A. convention

Back row, left to right: George Rae, Gordon Sailors, Joyce Sooter, Marion Stevens, Carl Bartel.
Front row: Wesley Wheeler, Dr. O. A. Hankammer, Forest Penney, J. Kelly Mudd, Morten Gundersen

Prof. Harold G. Palmer brought his 45-ft. trailer "Mobile Shop" and had it on exhibition throughout the convention.

♦ The Georgia Industrial Arts Teachers clinic on June 8, 1949, was attended by about 30 teachers, administrators, and students. Responses from the teachers in the state indicated that attendance would have been much greater had the program been scheduled prior to the close of the school year. Postschool planning and summer school attendance interfered.

The Georgia Teachers College, Industrial Arts Building, the Laboratory High School Shop, the elementary school shop, and the Statesboro High School shop, were open for inspection in the morning. The early arrivals spent their time in looking over these shops, and talking about various organizational and administrative problems.

At one o'clock demonstrations in freehand drawing, Keene cement craft, leathercraft, photography, and tin-can craft were presented by students of this department and were enthusiastically received. The demonstrations were planned to show those present the tools, materials, procedures, and possibilities involved in introducing these areas in the shop program.

V. E. Glenn, superintendent of the Swainsboro, Ga., public schools, delivered an address in which he brought out the desirable features of an industrial-arts program as seen by a school superintendent.

The last feature of the program was a discussion of some of the problems confronting the teachers and administrators in the state. — *Donald F. Hackett.*

♦ The officers of the trades and industries division recently elected at the Colorado Vocational Education Conference at Estes Park, Colo., are: W. R. Hickman, vocational education coordinator, Longmont, Colo., chairman; Leland A. Benz, vocational director, Pueblo, Colo., Vocational School, cochairman; and H. E. Bowlds, state board for vocational education, Denver, Colo., secretary-treasurer. — *H. E. Bowlds.*

INDUSTRIAL EDUCATORS SUPERVISORY CONFERENCE

On August 11, 12, and 13, about forty supervisors of industrial education met on the invitation of Dr. Fred Strickler, dean of Bennett College, Bradley University, at Bradley University, Peoria, Ill. (See photograph, page 18A.)

Those who attended were housed at Harper Hall, Bradley University, and all of the meetings, except one, were held in the excellently appointed conference room of the Caterpillar Tractor Company at Peoria.

Ernest J. Simon, director of vocational education, state of Illinois, Springfield, Ill., acted as chairman.

At the opening meeting Dr. Strickler explained why he had invited the municipal and state supervisors of industrial education, and stated his ideas on the value of organizing a supervisor's conference. L. J. Fletcher, director of training and community relations, Caterpillar Tractor Company, welcomed those present to the plant, and to the facilities which it could offer.

Floyd M. Dickey, instructor of industrial atrs at the John Adams School, South Bend, Ind., had been sent to attend the conference in place of George F. Weber, industrial education director of South Bend. Mr. Dickey described the organization and administration of his general shop and had about a dozen panels of exhibits to show the type of work that is done in his classes. A lively discussion followed his presentation.

The subject for the afternoon was largely on shop safety. Wayne P. Hughes of the National Safety Council, and others made this meeting exceedingly worth while.

For Thursday evening the conference members were taken on a trip through the Keystone Steel and Wire plant. The night was hot and the plant was hotter, but not one of those who made the trip would have missed it for anything. Everyone was agreed that more such trips ought to be arranged for those engaged in industrial arts and vocational education.

Friday morning and afternoon D. Arthur Bricker, supervisor of industrial arts of the Cincinnati Public Schools, and Roy A. Radtke, supervisor of industrial arts, Milwaukee, Wis., described the work done under their supervision in their respective cities. Curriculum revision in city and state also was discussed.

For Friday evening the McKnight and McKnight Publishing Company had arranged a trip through their plant, followed by a delightful banquet at Bloomington, Ill. Their courtesy was much appreciated.

At the Saturday morning session a business

(Continued on page 20A)

compare the SPECIFICATIONS of these 11" Logan LATHES then compare the PRICE*

Quick Change Gear Floor Model Lathe, 11" Swing, 1" Collet Capacity, 1⅜" Spindle Hole, 24" and 36" between centers.
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LOOK TO Logan FOR BETTER LATHES AND SHAPERS

8

Organization meeting — Industrial Educators Supervisory Conference, August 11, 12, 13, 1949

Reading from left to right, lower row: P. S. Waldeck, State Supervisor of Industrial Arts, State Department of Education, Columbus, Ohio; M. J. Ruley, Director, Industrial Arts and Vocational Education, Box 131, Tulsa, Okla.; Charles A. Roper, Publication and Sales Manager, McKnight and McKnight Pub. Co., Bloomington, Ill.; Fred Strickler, Dean of Bennett College, Bradley U., Factotum of the Conference; Fred Dace, Assoc. Dean, Bennett College, Bradley U., 107 Armstrong, Peoria, Ill.; Laurens L. Simpson, President, The Manual Arts Press, Peoria, Ill.; John J. Matthews, Director, Vocational Education, Gary, Ind.; Ray A. Radtke, Supervisor of Industrial Arts, Milwaukee, Wis.; R. H. Simpson, Vice-president, The Manual Arts Press, Peoria, Ill.; Euclid Lambert, Co-ordinator, Industrial Arts, Kankakee, Ill.; Middle row: Arthur L. Reagh, Director, Industrial Arts and Vocational Education, Grand Rapids City Schools, Grand Rapids, Mich.; J. H. Hawkins, Supervisor of Industrial Arts and Vocational Education, Danville, Ill.; Paul R. Waugh, Director, Vocational Education, Peoria, Ill.; A. L. Cunningham, Vocational Co-ordinator, Gary Public Schools, 524 Garfield St., Gary, Ind.; John F. Rebabm, Consultant, Industrial Education, Minneapolis, Minn.; John J. Metz, Editor of **Industrial Arts and Vocational Education**, The Bruce Pub. Co., Milwaukee, Wis.; L. P. Elliott, Supervisor of Industrial Arts, Peoria, Ill.; Harlan J. Shufelt, Supervisor of Industrial Arts, Racine, Wis., also, Sec.-Treas., Wisconsin Industrial Arts Assn.; Ernest J. Simon, Director of Vocational Education, State of Illinois, Springfield, Ill.; Wayne P. Hughes, National Safety Council, Chicago, Ill.; Upper row: Floyd M. Dickey, Industrial Arts Instructor, John Adams School, South Bend, Ind.; Amos D. Coleman, State Supervisor of Industrial Arts, Board for Vocational Education, Springfield, Ill.; Alvin H. Miller, Supervisor of Industrial Arts, Lincoln Public Schools, Lincoln, Nebr.; George E. Kohrman, State Director of Industrial Ed., Jefferson City, Mo.; Lawrence W. Prakken, Editor, **School Shop**, Ann Arbor, Mich.; James Ingram, Instructor of Machine Shop and Apprentices, South Bend, Ind.; Paul Van Winkle, Editor, Manual Arts Press, Peoria, Ill.; Burton C. Smith, Supervisor of Industrial Arts, La Crosse, Wis.; D. Arthur Bricker, Supervisor of Industrial Arts, Cincinnati Public Schools, 216 East Ninth Street, Cincinnati 2, Ohio; L. J. Fletcher, Director of Training and Community Relations, Caterpillar Tractor Co., Peoria, Ill.

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ASSOCIATION NEWS

(Continued from page 348)

meeting was held at which it was decided that this first conference proved of great value, and that the organization should be continued. The name "Industrial Educators Supervisory Conference" was adopted.

It was also decided that the membership of the conference be tentatively limited to 65.

Those who attended this first conference are to constitute the charter members, and additional members may be elected only by the conference at a regular meeting.

The officers for the coming year are: M. J. Ruley, director of industrial arts and vocational education, Tulsa, Okla., chairman; Dr. Fred Strickler, dean of Bennett College, Bradley University, Peoria, Ill., executive secretary.

The next conference will meet at Bradley University on June 29, 30, and July 1, 1950.

♦ The Connecticut Industrial Arts Association Executive Committee met at New Haven, Conn., on Wednesday evening, May 6, 1949. It was decided to hold the fall convention of the association at New Haven on Friday, October 28. The luncheon meeting will be held in the Y.W.C.A. building at 12:30 p.m.

The theme of the convention will be "Evaluating the Modern Program through Industrial Arts." John Stapleford of Bassett Junior High School, New Haven, is the program chairman.

The spring conference of the Connecticut Industrial Arts Association will be held at New Britain Teachers College on March 24 and 25, 1950. The theme of this meeting will be "Shop Layouts and Equipment." — *Ernest C. Boni.*

♦ The industrial-arts section of the Pennsylvania Vocational Association was held June 22 to 24 at Eaglesmere, Pa. There were unique demonstrations of silversmithing, plastics, and how to make slide films for use in the shop.

The discussion groups on "What Can I Do to Improve the Professional Status of Industrial Arts Education in Pennsylvania" and "What Do We Want for Industrial Arts Education" were well attended.

The projects and teaching aids which were brought along by some of the teachers were very helpful.

♦ The officers of the Tucson Industrial Arts and Vocational Education Association for 1949–50 are as follows: Herm A. Klenck, president; Robert Benzcik, vice-president; Fred Piziali, secretary-treasurer.

The members of this association are from the Tucson senior high and junior high schools, the Deaf and Blind School, and the Amphitheater School. Meetings are held once a month in the different shops of the members. During the meetings, discussion centers around improving industrial arts and vocational education through shop films, demonstrations, talks, and trips to industrial plants.

The Tucson organization would like to hear from other groups. They are curious as to what others are doing to have a successful organization. Kindly write to Mr. Herm A. Klenck, Tucson Senior High School, or Mr. Fred Piziali, Wakefield Junior High School, Tucson, Ariz.

♦ The Four-State Regional Conference on Industrial Education for 1949 will be held on the campus of the Kansas State Teachers College, Pittsburg, Kans., on October 21 and 22.

Two recognized leaders in industrial education have accepted invitations to be the principal speakers during the conference. These speakers are Prof. Arthur B. Mays of the University of Illinois, and Dr. Fred W. Hosler, superintendent of the Oklahoma City public schools.

Dr. Hosler has chosen for his subject, "Challenges of the Forgotten Students," and Prof. Mays will discuss "The Role of the Public School in Industrial Education" and "The Meaning and Place of Industrial Arts in Secondary Education."

The Epsilon Pi Tau fraternity is tentatively planning to hold initiation services for new members at the conference. All alumni members are urged to make plans to attend the conference and the initiation.

♦ The new officers elected at the annual meeting of the Nebraska Vocational Agricultural Association, held on the University of Nebraska campus June 1, 2, and 3, 1949, are: James Wall, Waverly, president; Harlan Knoche, Scottsbluff, vice-president; and Howard Kech, Creighton, secretary.

♦ The annual convention of the National Society for Crippled Children and Adults will be held November 7, 8 and 9 at the Commodore Hotel, New York.

Prominent authorities working in the field of the handicapped will present latest developments at the three-day session marking 28 years of service for the society.

Delegates from 2000 state and local affiliates of the national society will discuss research, rehabilitation, training, and treatment for the handicapped.

♦ The National Safety Congress and Exposition will be held in Chicago, Ill., October 24 to 28.

Nearly 12,000 safety-minded persons from all corners of the United States and from Canada and other parts of the world will meet there for five days at the 37th annual convention of the National Safety Council.

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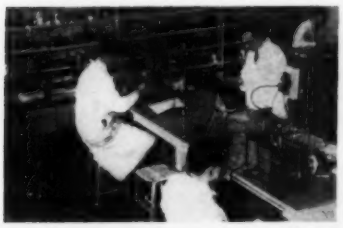

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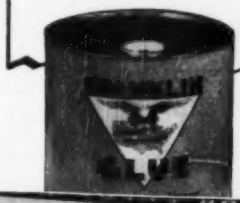
Above are excerpts from letters in our files. Names and addresses will be furnished on request.



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Personal News

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Robert P. Melius has been elected vice-president of Rockwell Mfg. Co., Pittsburgh, Pa. He was recently placed in charge of sales for the newly created Power Tool Division, which will

Robert P. Melius

market Delta, Crescent, Multiplex, and Delta-Homecraft wood and metalworking tools. He has been with the Delta Mfg. Division for 19 years, and sales manager since 1935.

♦ REAR ADMIRAL GEORGE S. BRYAN, U. S. Navy, ret., is the new dean of the faculty of International Correspondence Schools. After a distinguished World War II record in helping the Australian navy map the Pacific Theater, for which he was decorated by the British Empire, Admiral Bryan, Annapolis '06 and former commander of the U. S. S. Maryland, became director of the I.C.S. School of Navigation. He was appointed from that post by President Ralph E. Weeks to head the Schools' 400-man teaching staff when Samuel Baker, former dean, resigned because of ill-health.

♦ OTTO J. DOOB, director of the Vocational School at Fond du Lac, Wis., since 1924, was feted at a celebration of his silver anniversary as head of the school. He was presented with a gold wrist watch from the faculty.

Speakers at the anniversary celebration were C. L. Greiber, Madison, state director of vocational and adult education; W. E. Rutz, president of the Fond du Lac Vocational school board of directors; H. L. Sherman, director of the Menasha Vocational School, and president of the state directors organization; A. M. Bleber, director of the Oshkosh Vocational School, who represented the directors' 25 Year Club; Mayor Edwin F. Weis; M. J. Lowe, Madison, field representative of the extension division of the University of Wisconsin; H. J. Van Valkenburg, co-ordinator at Fond du Lac Vocational School; Miss M. Elizabeth Geve, principal of the Vocational and Adult Evening School; and L. E. Hiller, Fond du Lac, representing the circuit teachers.

John Te Poorten, Madison, occupational extension co-ordinator, was toastmaster.

♦ LINDLEY H. BENNETT, 75, noted educator of Toronto, Canada, died April 6, 1949.

Mr. Bennett was born in Somerset, England, and was educated in England. He came to Canada in his early twenties, and started his educational work as teacher of English in Quebec. In 1902 he joined the staff of the only normal school in existence at that time in the Northwest Territories at Regina. He also was attached to the territorial government before Alberta and Saskatchewan entered into the Confederation. Later he taught shopwork, architecture, and English at the Institute of Technology and Art at Calgary. He retired about ten years ago.

Mr. Bennett's article on "The Present Position of Industrial Arts in Canadian Schools," appeared in the March and April, 1949, issues of this magazine.

♦ R. RANDOLPH KARCH, director of education, Graphic Arts Industry, Inc., Minneapolis, Minn., delivered the address at the formal initiation and dinner of the STS organization at The Stout Institute, Menomonie, Wis., held on Wednesday, May 18, 1949.

Mr. Karch taught printing in high schools, was technical supervisor of printing and publishing at Rochester Institute of Technology and later principal of the Graphic Arts High School, Cincinnati, Ohio.

Those initiated into the organization as apprentices are: Roland Morley, James Ooley, Donald Sargent, Roland Wolfe, Stanley Hoffman, and Donald Greisback. Those being advanced to journeyman are Thorval Hendrickson, Jerome Larson, Charles Thomas, Robert McKay, Gordon Nooyen, Milo Anderson, Robert Manson, Irvin Lathrop, and Carl Johnson. Lloyd Gannegan, Parnik Hazarian, and George Norton will be installed as master printers.

♦ PROFESSOR HEBER DUNHAM of the New York University College of Engineering, New York City, retired recently as professor emeritus.

The post of professor of engineering drawing and descriptive geometry has been held by Mr. Dunham since 1930. Born in Troy, New York, in 1884, he was graduated from Purdue University with the bachelor of science degree in mechanical engineering in 1909. His long career with New York University began when he was appointed instructor (1909–15), assistant professor (1915–20), and associate professor (1920–30).

(Continued on next page)

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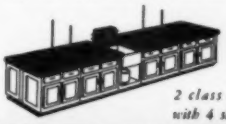

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PERSONAL NEWS

(Continued from previous page)

Professor Dunham served as secretary of the Engineering College faculty from 1920–30. He taught at Poppenhausen Institute from 1910–19, and taught courses in descriptive geometry, shades and shadows, and perspective at New York University's College of Fine Arts from 1927–31, in addition to his regular work at the College of Engineering.

Professor Dunham is a member of the Society for Promotion of Engineering Education. He also has served on university committees including those for admissions and freshman scholarships.

♦ W. E. Mahin, chairman of metals research at Armour Research Foundation of Illinois Institute of Technology, has been named director of research.

Mr. Mahin will head a group of 411 scientists, engineers, and technicians, who are at present working on 125 active research projects for industrial and government sponsors.

For ten years previous to his joining the Research Foundation in 1947 Mr. Mahin was in charge of metallurgical engineering at Westinghouse Electric Corporation, Pittsburgh, Pa.

Mr. Mahin succeeds Dr. Martin H. Heeren, who will be director of applied research with the sapphire division of Elgin National Watch Company, Aurora, Ill.

♦ G. Joseph Oeltman of Monrovia has been elected as an instructor of auto mechanics at the Mt. San Antonio College, Pomona, Calif. Mr. Oeltman has had over nine years' experience in the automotive field as a mechanic and foreman. In addition to experience as a teacher in both the states of California and Pennsylvania, he is a graduate of the State Teachers College, California, Pa., with additional courses in the field of auto mechanics completed at the General Motors Institute, Flint, Mich., and the Electric Auto Lite Co., Toledo, Ohio.

Mr. Oeltman's graduate work has been done at the University of California, Los Angeles, Calif., and the University of Pittsburgh, Pittsburgh, Pa.

♦ In the June and August commencements, 14 individuals received their master's degrees in industrial education from the University of Missouri as follows:

James H. Davis, Richmond, Ky.; Vincent R. Faulds, McCrory, Ark.; Gerald M. Maddux, Chico, Calif.; George W. Sentenev, Carbondale, Ill.; Robert B. Sonderman, St. Louis, Mo.; William P. Spence, St. Louis, Mo.; Philip A. Conrad, Oakland, Calif.; Virgil O. Todd, Overland, Mo.; William Gerken, Savannah, Ga.; Edward M. Ruddy, Farmington, Mo.; Herman Hoffman, Desloge, Mo.; Winfred H. Sharp, Nashville, Tenn.; Nell M. Doyle, Austin, Tex.; and Alfred H.-Redding, Springfield, Ill.

♦ J. W. Giachino has been awarded the degree of doctor of education by The Pennsylvania State College. The title of his dissertation is "An Analysis of the Success Factors Which Should Be Emphasized in the Training of Competent Teachers of Industrial Arts." Dr. Giachino is professor of industrial education and associate director of vocational industrial education at Western Michigan College of Education, Kalamazoo, Mich. He is a frequent contributor to industrial education periodicals and is the author of several textbooks.

♦ Charles Rugh, a friend to thousands of vocational and industrial-arts educators in the East and Southeast, died in a Fairmont (W. Va.) hospital of a cerebral hemorrhage on July 18. Mr. Rugh has represented the American Technical Society in that territory for the past seven years.

Mr. Rugh was graduated from the State Teachers College of Indiana, and taught in the Pennsylvania schools for several years. He later attended the University of Michigan and received the B.A. degree in physical education. His first coaching position was at Riverside High School, Milwaukee, and he later became director of physical science at Saginaw, Mich. In 1942 he joined the American Technical Society.

♦ Dr. Kenneth L. Bing, formerly head of the department of industrial arts at the Southeast Missouri State Teachers College, Cape Girardeau, has accepted a similar position at the East Carolina State Teachers College, Greenville, N. C.

A. G. Williams, associate of Dr. Bing, has been elevated to the position of head of the department at the Southeast Missouri State College.

♦ A. R. Bailey of Wichita, Kans., received his doctor's degree in industrial education from the University of Missouri during the 1949 summer session, and is now at the University of Washington, where he is establishing a new department of industrial education. Dr. Bailey was formerly principal of the Portland, Ore., apprentice school.

♦ Harvey W. Waffle has taught the eight-week summer session at the Colorado A. & M. College, at Fort Collins, Colo. While there he taught several graduate courses, and functioned as advisor of theses and reports. Other teachers at the summer session were Dr. S. L. Coover, Raymond Cherry, and Oliver Winter.

♦ Dr. Gordon O. Wilber is taking a semester's leave from Oswego State Teachers College, to take an extensive trip across the country to visit colleges where industrial-arts teachers are being trained.

The itinerary takes in Pennsylvania, Ohio, Indiana, Michigan, Illinois, Wisconsin, Minnesota, Iowa, Nebraska, Colorado, Oregon, California, Arizona, New Mexico, Texas, Oklahoma, Kansas, Missouri, Tennessee, Virginia, District of Columbia, and Maryland.

♦ R. Graham Wagoner, Lee's Summit High School, Lee's Summit, Mo., has been made assistant professor of industrial arts at the Southeast Missouri State Teachers College, Cape Girardeau.

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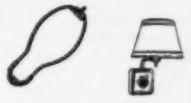

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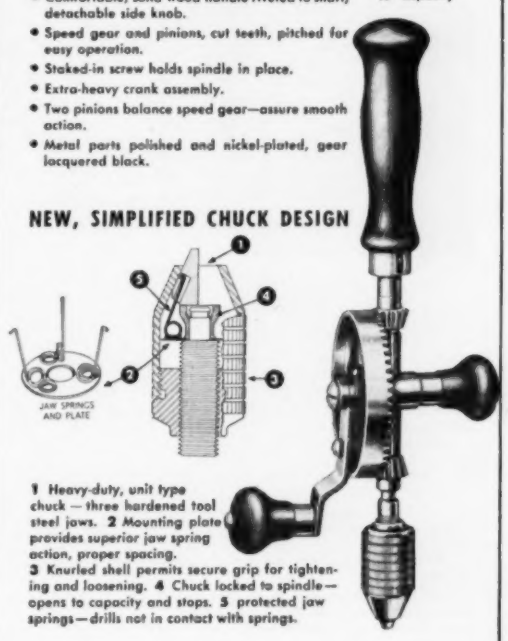

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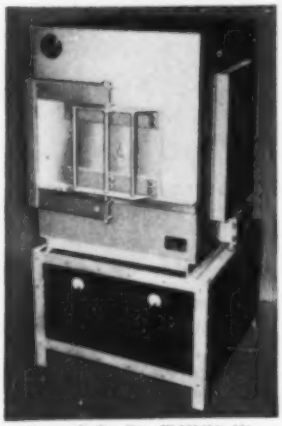

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Questions and Answers

COURSES ON JEWELRY MAKING

1137. Q.: I am interested in jewelry making and am looking for a school where such a course is taught.

I would also like to know about any factories which make and repair jewelry and have a course available for their workers.

I would appreciate any suggestions or information you could make available to me. — *J. T.*

A.: Handy and Harmon, 82 Fulton St., New York 7, N. Y., arrange silversmithing workshops for teachers of silversmithing. It might be wise to contact them to help you in your search for a school where jewelry making is taught.

I am unable to refer you to any factories where they have courses for their workers.

For books devoted to jewelry making, I would refer you to the following titles: *Jewelry and Enameling*, by Pack, $2.80; *Hand Made Jewelry*, by Wiener, $2.20; both published by D. Van Nostrand Co., Inc., 250 — 4th Ave., New York 3, N. Y.; and *Art Metalwork*, by Kronquist, $3.25; and *Jewelry, Gem Cutting, and Metalcraft*, by Baxter, $3; both published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y. — *J. J. M.*

LIMED OAK OR RUBBED OAK FINISH

1138. Q.: I am seeking information to obtain a light-colored modern finish for oak, called limed oak or rubbed lime finish. I am making a chest at our college industrial-arts shop. If you can give me the help on this method of finish it will be appreciated. — *W. M. C.*

A.: In answer to your question I feel that the following will best give you the limed oak finish you desire.

1. Sand all oak with the grain until smooth and free of all scratches, using 4/0 garnet, open-coat, cabinet grade stock for sanding.

2. Bleach all wood to a white or very light uniformity, using commercial No. 1 and No. 2 bleaching solution.

3. Resand, using the old papers from item 1.

4. Spray on a thin and uniform coat of wood lacquer, using one part of lacquer to two parts of thinner.

5. Dry hard and sand glass smooth with 6/0 garnet finishing paper, after dampening the back with water to make quite flexible but not wet.

6. Make up a standard wood filler and add enough titanium dioxide paste to make a very white filler, reduced at the rate of seven pounds of filler paste per gallon of reducer made from part pure turps and two parts white gasoline. Apply and rag off clean as in all filler practice.

7. Dry hard overnight. Spray with lacquer cut 50-50 for two thin coats. Dry 12 hours and rub with 3/0 steel wool and hard grade floor wax. Clean up with rags. — *Ralph G. Waring*

ADEQUACY OF INDUSTRIAL-ARTS TEACHER TRAINING

1139. Q.: I am conducting a research titled "Adequacy of Training Industrial Arts Teachers" and desire information in regard to trends in industrial arts, growth of industrial arts in the United States, shop organization, and recent studies in the field.

Any information which you can contribute on how to obtain this information will be greatly appreciated. — *D. R. E.*

A.: This is in answer to your recent letter. The information you seek is adequately covered in a number of articles which have appeared during the past few years in the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine. I am submitting a list of these titles and the date of publication, and hope you will find this material helpful. You will, no doubt, be able to examine

(Continued on next page)

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QUESTIONS AND ANSWERS

(Continued from previous page)

these back issues of our magazine at your college library. The list follows:

1946

April — Self-Evaluation Check List for Shop Teachers
May — The Industrial-Arts Teacher in a Pupil-Teacher Participation Program
Sept. — The Selection of Teacher Timber
Oct. — Teacher and Students Co-operate in Planning the Work
Nov. — Instructor Training in Vocational-Technical Training
Nov. — Industrial-Arts Teacher Training
Nov. — A Five-Year Curriculum in Teacher Training
Dec. — The Use of Training Aids

1947

Jan. — Industrial Arts Looks Ahead
May — Vocational Teacher Training and Certification
May — Road Map for Instructors
Sept. — State Syllabi in Industrial Arts
Oct. — Curriculum Construction and Instructor Training for the Navy

1948

Feb. — Teacher Training in Industrial-Arts Education
May — The Problem of Graduate Study in Industrial Education
May — Industrial-Arts Teacher Education Prepares also for Industry
Nov. — Industrial-Arts Co-operative Teacher Training
Dec. — Course Building — An Overview
Dec. — How Much College Credit for Trade and Industrial Experience?
Dec. — Co-operation of Industry and Education

1949

Jan. — School Shop Safety in the Teacher Education Program
Mar. — Workshop Held for Tulsa Industrial-Arts Teachers
April — Selecting an Institution for Graduate Study
May — The Department Chairman and His Job
May — Industrial Education for General School Administrators
May — In-Service Development of Industrial-Arts Teachers
May — Some Statements Prepared for the Vocational Teachers of Hesse, Germany
May — Upgrading Vocational Teachers
June — Selection, Preparation, and Presentation of Subject Matter
June — Some Statements Prepared for the Vocational Teachers of Hesse, Germany
June — Upgrading Vocational Teachers

— J. J. M.

News Notes

♦ During the week of August 8 to 12 the third state-wide Workshop for Trade Teachers was held at the University of Missouri. The Workshop, sponsored jointly by the state department of education and the department of industrial education of the university, was attended by about 60 trade teachers.

♦ "Improving the Effectiveness of Visual Materials" by Dr. John Guy Fowlkes, presents an analysis of the methods and applications of films, slides, and slide films. It is available without cost from Educators Progress Service, Randolph, Wis.

♦ Eight new scholarship awards, five for undergraduate work in industrial arts, and three for graduate study in various areas within the Department of Vocational Education, have been

(Continued on page 29A)

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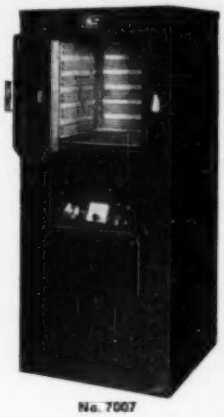

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NEWS NOTES

(Continued from page 27A)

established at New York University by the Hebrew Technical Institute.

The scholarships will be awarded annually beginning this year in September for the 1949–50 academic year. The undergraduate scholarships which will be called the "Edgar Starr Barney Memorial Scholarships in Industrial Arts" will be awarded to properly qualified high school graduates or undergraduate college students in the Department of Vocational Education of the university's school of education who wish to become teachers of industrial arts.

♦ A drafting institute was held at Wayne University for a two-week period, August 8 to 19. Two hours' graduate or undergraduate credit was earned by those who attended.

The institute was intended for those who teach drafting in junior and senior high schools, trade schools, and technical programs at the college level. The program consists of conferences and field trips.

The conference topics were: teaching aids, instructional resources, evaluation devices, courses of study, and other professional areas.

Field trips included visits to drafting rooms of the Rouge Plant of the Ford Motor Company, Chrysler Institute of Engineering, Chevrolet Tool and Die Design, Greenfield Village and Edison Institute, and General Motors Styling Section.

♦ Publication of a new manual on "Toxic Eye Hazards," dealing with various safeguards against the many chemicals now used in industrial processes, is announced by the National Society for the Prevention of Blindness.

Copies of this book may be ordered from the National Society for the Prevention of Blindness, 1790 Broadway, New York 19, N. Y. Price, $1 per copy, with reductions for quantity orders.

♦ The University of Toledo, Toledo, Ohio, will offer a graduate program in glass technology beginning with the 1949 fall semester.

The program will lead to the degree of master of science in glass technology and will be open to students who have been graduated from a recognized college or university with a major in chemical engineering, chemistry, or physics.

♦ A reprint of the article "Qualified Supervision Creates Effective Apprentice Training," from the Bulletin of the Washington Building Congress, explains the advantages of having a full-time supervisor to shoulder the detailed responsibilities involved in carrying out an area-wide apprenticeship program; the vital importance of a well-organized active joint management-labor committee to direct the program; and the benefits to apprentices of an efficiently conducted program in which they are given thorough all-round training on the job and adequate classroom instruction. Cited as examples of such a program are those in the electrical and plastering trades in Washington, D. C.

Copies of this reprint may be obtained free by writing to the Bureau of Apprenticeship, U. S. Department of Labor, Washington 25, D. C. When requesting copies, please mention the publication in which you read the announcement.

♦ The department of industrial education at the University of Missouri, in co-operation with the Missouri state department of education, is continuing its third year of curriculum construction work for Distributive Occupations. Marion P. Stevens of Pittsburg, Kans.; Wray D. Silvey of Eldon, Mo.; Charles A. Risher of Bowling Green, Ohio; and Charles R. Hill of Whitewater, Wis., are working on the project.

♦ A four-year curriculum in industrial-arts education will be instituted for the first time beginning next September at City College. The curriculum will lead to a B.S. in education degree and is to be under the direction of Albert R. Spillman, former supervisor of trade subjects for the vocational division of the New York City board of education.

♦ Executives of Johnson & Johnson, manufacturers of hospital supplies, have written a timely book devoted to the improvement of teamwork and of productivity throughout business and industry.

The book bears the title, "Training Employees and Managers for Production and Teamwork," and shows that training within industry is the solution to the indifference, inefficiency, and lack of teamwork which exists in many offices and shops today.

The book is published by Ronald Press, 15 East 26th St., New York City, N. Y.

♦ In an attempt to make it possible for home owners to have both variety in house design and economy in construction, the Small Homes Council of the University of Illinois, Urbana, Ill., has undertaken a 12-month investigation into planning and building techniques. The work is being carried on under a research grant given to the University by the newly organized Lumber Dealers Research Council, which is an organization composed of 177 lumber dealers from 28 states who believe that progress in solving the nation's housing problem can be made through research.

♦ A total of 238,357 apprentices are now registered (May 24, 1949) with the Labor Department's Bureau of Apprenticeship or with state apprenticeship agencies, and 6630 joint management-labor apprenticeship committees have been established.

Despite the progress that has been made throughout the nation in the development of apprenticeship, much more can and ought to be done. Every locality in America, where skilled men are needed, should establish an apprenticeship program, and there should be more careful selection and screening of applicants for apprenticeship.

♦ The need for an adequately trained force of skilled man power was stressed by Secretary of

(Continued on next page)

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HEAVY DUTY 24" x 5"
JIG SAW

For fast, clean, accurate, vibrationless contour and straight cutting, inserted blade work, heavy jig sawing, die filing, saber sawing, and sanding of metals, woods and plastics. Only 24" jig saw that cuts materials up to 5" thick.

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The heavy one-piece, iron cast base with a broad flanged foot for mounting, prevents misalignment of moving parts.

Only 24" Jig Saw capable of using any blades 5" to 9" long. Many times the capacity and versatility of others. Blades may be turned 90° for ripping long stock.

SPECIFICATIONS:

Capacities: Under holddown—5".
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Joint Conference of representatives of American Vocational Association, U. S. Office of Education and Bureau of Apprenticeship, U. S. Department of Labor, in Washington, D. C., April 1, 1949:
Seated left to right: William F. Patterson, Director, Bureau of Apprenticeship, U. S. Department of Labor; Maurice J. Tobin, Secretary of Labor; E. L. Williams, President, American Vocational Association;
Standing left to right: E. K. Jenkins, Assistant Director, Bureau of Apprenticeship; M. Norcross Stratton, American Vocational Association; L. H. Dennis, Executive-Secretary, American Vocational Association; C. L. Greiber, American Vocational Association; Charles W. Sylvester, Treasurer, American Vocational Association; J. C. Woodin, Vice-President, American Vocational Association; William J. Moore, Assistant Director, Bureau of Apprenticeship; Raymond W. Gregory, Assistant Commissioner, U. S. Office of Education; Maurice M. Hanson, Edw. E. Goshen, Ansel R. Cleary, Assistant Directors, Bureau of Apprenticeship.

NEWS NOTES

(Continued from previous page)

Labor, Maurice J. Tobin, at a recent joint conference in Washington of representatives of the American Vocational Association, the U. S. Office of Education, and the Labor Department's Bureau of Apprenticeship.

E. L. Williams, president of the American Vocational Association, and William F. Patterson, director, Bureau of Apprenticeship, were co-chairmen of the conference. Other representatives of the American Vocational Association attending the meeting were J. C. Woodin, vice-president; L. H. Dennis, executive secretary; Charles W. Sylvester, treasurer; M. Norcross Stratton and C. L. Greiber. Also in attendance were Raymond W. Gregory, assistant commissioner, U. S. Office of Education; and assistant directors of Bureau of Apprenticeship, Ansel R. Cleary, E. K. Jenkins, William J. Moore, Maurice M. Hanson, and Edward E. Goshen.

♦ Publication of a 1949 catalog, "U. S. Government Films for School and Industry," was announced recently by the Office of Education, Federal Security Agency.

Latest of a series of yearly catalogs, published by Castle Films, the 1949 edition describes 1964 motion pictures and film strips of the Federal Government which have been released to the public for noncommercial, educational use, and which can be purchased from Castle Films, the contractual distributor of Office of Education films. Included in the catalog are films of 13 different government agencies, including the departments of agriculture, air force, army, navy, and state, the coast guard, public health service, and office of education.

Copies of the catalog may be obtained without charge from the Office of Education, Federal Security Agency, Washington 25, D. C., or from Castle Films, 1445 Park Ave., New York 29, N. Y.

♦ An 8-page circular, "Cabinet Space for the Kitchen," by the Small Homes Council of the University of Illinois, has just been released.

The circular presents results of a research study conducted by the Council in co-operation with the agricultural experiment station.

The research project included studies on both "ample" and "minimum" space. In all cases, items were stored at the point of first use, and in such a way that they could be easily seen and reached in order to save the homemaker steps, time, and trouble.

"Cabinet Space for the Kitchen" can be obtained from the Small Homes Council, University of Illinois, Urbana, Ill., at 10 cents a copy.

♦ A 4-page folder containing information on Westinghouse scholarships has recently been announced by the school service department of the Westinghouse Electric Corporation and is available upon request for distribution to high school teachers.

The folder contains descriptions of the scholarship contests, with complete details concerning awards, eligibility, selection of winners, conditions of the awards, and method of entry.

Teachers can secure copies of the scholarship booklet through the School Service Department, Westinghouse Electric Corporation, 306 Fourth Ave., Box 1017, Pittsburgh 30, Pa.

♦ Ideal Pictures Corporation has just issued a new catalog of Coronet Films. Of special interest to industrial-arts teachers are the films on guidance, social studies, physical science, and physical education.

For rental rates and film reservations write to the office nearest to your school.

List on last page of catalog.

♦ The United States Department of Labor, Bureau of Labor Statistics, Washington 25, D. C., reports that the electrical industry is now planning an expansion of capacity, which will create thousands of new job openings over the next ten years. This employment increase, plus necessary replacement of workers who die, retire, or leave the industry, will provide opportunities in many different occupations, including electrical engineers, office workers, linemen, meter readers, and power plant workers.

These are the principal conclusions of a report on "Employment Outlook in Electric Light and Power Occupations" (Bulletin 944), published by the U. S. Bureau of Labor Statistics. The study was prepared for use in vocational guidance of veterans, and for young people in schools and colleges. It presents detailed discussions of the employment opportunities, duties, training, earnings, and working conditions in all the important occupations in the electric utility field.

Copies may be purchased from the Superintendent of Documents, Washington 25, D. C., for 30 cents.

♦ More than 400 sources of information on radio and television are listed in a new Radio and Television Bibliography just issued by the Office of Education, Federal Security Agency.

Accompanying each reference is an annotated description. In addition to general radio and television sources, the bibliography offers summaries of published information on careers in radio, broadcasting techniques and script writing, radio education, scripts, books and plays.

Copies are available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 15 cents each.

♦ Dean John F. White announced the establishment at Illinois Institute of Technology of the Stephens-Adamson Foundation scholarship fund to

(Continued on page 32A)

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■ NEW DESIGNS

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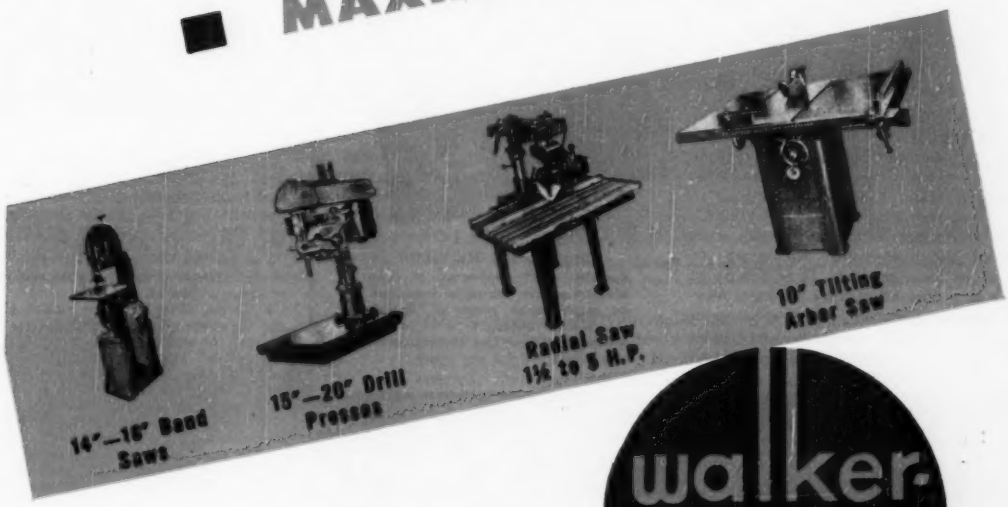

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NEWS NOTES

(Continued from page 30A)

provide assistance for deserving students in civil and mechanical engineering.

D. L. Stephens, president of the Foundation and also president of the Stephens-Adamson Manufacturing Company, both in Aurora, Ill., established the fund.

Foundation officers, in addition to Mr. Stephens, are R. W. Bauer, vice-president, and R. S. Wells, secretary-treasurer.

♦ Children's Day, a logical companion to Mother's Day (in May) and Father's Day (in June), will be observed throughout the nation for the first time this year. Sunday, October 16, is the date for 1949 and thereafter it will be observed annually on the third Sunday of October.

♦ Twelve teachers of metalwork in universities, colleges, art schools, and high schools in the United States and Canada were awarded fellowships to attend the third national Silversmithing Workshop Conference for teachers on August 1 to 26, 1949. Handy and Harman, 82 Fulton St., New York 7, N. Y., refiners of precious metals, sponsored the workshop at the Rhode Island School of Design in Providence, R. I.

♦ Vocational counseling given to veterans planning to train under the G.I. Bill and Public Law 16 has proved an effective aid in fitting ex-servicemen in the occupations for which they are best qualified.

This conclusion was reached by a committee headed by Dr. Leonard Carmichael, president of Tufts College, Medford, Mass., after studying the case histories of a representative group of 1700 veterans who had received advisement and guidance from V.A.

Eighty-four per cent of the veterans stated they were satisfied with the counseling services they had received.

More than three fourths of these were actively employed, at the time of the study, in vocational fields which they and their V.A. counselors had agreed was best for them to undertake.

♦ Almost one quarter of the nation's 26,000 high schools included some form of automobile driver education in their curriculums during the past school year, according to the American Automobile Association, Pennsylvania Ave. at 17th St., N.W., Washington 6, D. C.

In its annual report on the subject, the A.A.A. disclosed that more than 340,000 high school students successfully completed driving courses that included behind-the-wheel training.

♦ Carnegie-Illinois Steel Corporation will highlight the vocational meeting of the National Safety Congress and Exposition. E. Earl Moore, vice-president in charge of industrial relations; Dan Farrell, supervisor of safety; and W. P. Jones, supervisor of training, will present on Tuesday afternoon, October 25, the company's most recent contribution, "A New Program of Safety Instruction for Vocational Students."

♦ The names of eight winners of scholarships to study in the new field of milling engineering during the coming school year at the University of Minnesota were announced on August 14 by John M. MacKenzie, university assistant professor in charge of milling engineering.

The grants, ranging from $150 to $300, were provided by gifts to the 1949 campaign of the Greater University Fund from flour milling firms and friends of the University.

♦ Complete reports on the employment outlook in each of 288 occupations, including not only the professional and "white-collar" fields and the major types of farming, but also many industrial occupations, a field in which most young people will find employment, is contained in the 454-page illustrated Occupational Outlook Handbook, Bulletin 940 of the Bureau of Labor Statistics, on sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for $1.75.

♦ Make the observance of Fire Prevention Week, October 9 to 15, as impressive to your students as possible.

♦ "Living Silver," a color motion picture telling the story of handwrought silver, its history through the ages, its contemporary production, its beauty and practical uses, is being distributed by A. F. Films, Inc., 1600 Broadway, New York 19, N. Y.

Produced by Science Pictures with the cooperation of the Metropolitan Museum of Art, and Margaret Craver, consulting silversmith to Handy and Harman, the picture shows the individual expression of each piece.

♦ Earl James McGrath, commissioner of education, Federal Security Agency, invited all chief state school officers to designate representatives of their respective states to attend a conference of State Directors of Audio-Visual and Radio Education held in Chicago, Ill., on August 2 and 3, 1949.

The conference considered current problems in the field of audio-visual and radio education.

♦ The story of aluminum, from ore to consumer, is the newest exhibit at Chicago's Museum of Science and Industry, 57th and Lake Michigan, Chicago 37, Ill. Sponsored by the Aluminum Company of America, the exhibit was opened to the public Wednesday, August 3.

Central feature of the exhibit is a large, symbolical diorama depicting the pouring of molten aluminum into the channels of commerce and industry to dramatize the hundreds of aluminum products which intimately affect the life of the American consumer. A recorded narration describes many of the complicated manufacturing processes the metal undergoes before

(Continued on page 34A)

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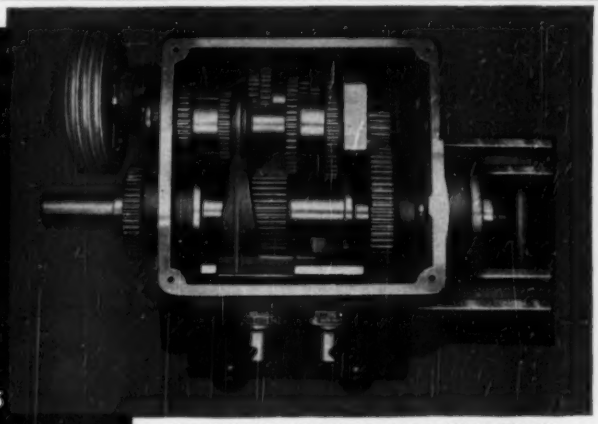

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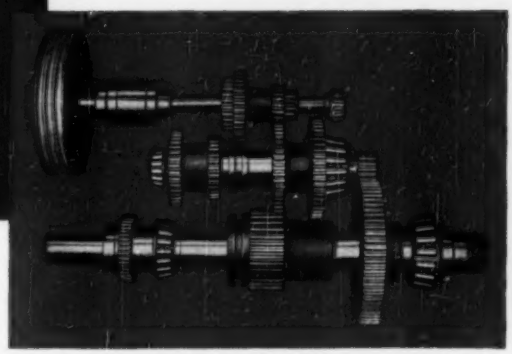
Interior view showing sliding gear transmission.



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Shaved headstock gears for quiet operation . . . Neutral point in head permits revolving spindle freely by hand for chucking work . . . Large hole through spindle . . . Headstock completely sealed . . . Multi-colored, direct-reading control dials for obtaining spindle speeds quickly and easily . . . Reverse in apron for feeds—adds to operating convenience . . . 57 feed and thread changes . . . Taper gibs . . . Apron control for start, stop, and reverse of lathe spindle (standard on lathes with 10′, 12′, and 14′ beds—also available on other bed sizes).

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NEWS NOTES

(Continued from page 32A)

it is transformed into sheet, foil, rod and wire, plate, castings, extrusions, and other commercial forms.

♦ To better instruct and experience the students in the operation of gasoline engine driven arc welders, the Hobart Welding School, Troy, Ohio, has initiated an outside class in arc welding.

The school is located in the rear of the main welding school on a concrete surface and consists of eight 6 by 6 ft. welding booths and eight gasoline engine driven arc welders. The booths are welded pipe covered with flameproof canvas. A flameproof canopy protects the students from the hot sun.

All advanced welding students spend a full week of their welding training period out in the fresh air learning to operate gasoline engine driven arc welders. Each student has a booth and a welder for his own use during his outside training period. He learns how to start, stop, and adjust the welding current of the machine, as well as general information on servicing the machine.

♦ The Department of Industrial Education at Wayne University, Detroit, Mich., reports that a total of 152 students were programmed through this department during the summer session.

These students were classified as follows: undergraduates, 73; special students, 1; doctor of education, 7; M.E. degree, 71. They came from sixteen states — Massachusetts, Virginia, Ohio, Missouri, New York, Louisiana, West Virginia, Pennsylvania, Minnesota, California, Texas, Georgia, Wisconsin, New Jersey, Oklahoma, and Tennessee. There also were two students from Canada, one from Puerto Rico, and one from Persia. A good representation came from Michigan, which had students from 21 cities.

New Publications

Alternating Current Fundamentals

By Clarence H. Bensman. Paper cover, plastic binding, 161 pp., 8 by 10¼ in., illus., $2.75. Clothbound edition, $3.60. Delmar Publishers, Albany, N. Y.

This is a text for all who want to acquire an understanding of the fundamentals of alternating current circuits and a knowledge of how to apply this knowledge under actual working conditions.

The explanations throughout the book are clear and concise, and the illustrations consist, for the most part, in easily understood line drawings.

The book contains 22 information units, and 21 experiment units.

The appendix presents tables of circuit diagram markings, power terminal markings, electrical symbols, and natural trigonometric functions.

Industrial Electronics

By Harold W. Ranney. Paper cover, plastic binding, 213 pp., 8 by 10¼ in., illus., $3.25. Clothbound edition, $4. Delmar Publishers, Albany, N. Y.

A book for electricians, technicians, students, and instructors who want to acquire a working knowledge of industrial electronic control.

The book is divided into 25 information units which present the necessary instructional material on the tubes, rectifiers, controls, etc., used in electronics. There also are 21 practical units in the book, together with a list of definitions, a table of symbols, and a chart of typical applications of electronic control tubes, and several pages of rectifier circuit data.

Meet the Plastics

By Clark N. Robinson. Cloth, 172 pp., 6¼ by 9½ in., illus., $3.75. The Macmillan Co., New York City.

The author, who has been a teacher, a curriculum director, and a superintendent of schools for almost 20 years, but who is now a member of a firm furnishing plastics and information about them to schools, presents in this book a clear explanation of the various kinds of plastics, their limitations in use, and how they compare with other materials.

The book also contains a list of manufacturers who make the various types of plastics, and the schools in the United States and Canada that give courses in the subject.

Out-of-School Vocational Guidance

By Roswell Ward. Cloth, 155 pp., 5¼ by 8¼ in., $2.50. Harper & Brothers, New York City.

A book for those who have to give vocational guidance to out-of-school youths and adults.

The book gives helpful information on how to organize a community vocational guidance service; how this service operates; how the counselor can act as a fact finder, co-ordinator, and planner; what training such a counselor needs; some directives to the counselor; and how vocational guidance can assist in solving the national peacetime man-power problems.

Rehabilitation of the Handicapped

By William H. Soden. Cloth, 399 pp., 6½ by 9⅛ in., $5. The Ronald Press, New York City.

A helpful book for those engaged in rehabilitating the physically and mentally handicapped.

The book is divided into five parts which discuss general medical and surgical techniques, neurological methods, psychiatric developments, vocational and social rehabilitation, and educational and psychological trends.

Elementary Hand Craft Projects

By D. C. Blide. Paper cover, 92 pp., 8⅛ by 10¾ in., illus., $1.75. Pitman Publishing Corp., New York City.

(Continued on next page)

NEW PUBLICATIONS

(Continued from previous page)

A helpful book for those who are training young handcrafters.

Many projects are pictured, and clear directions are given on how to make them. The subjects covered are linoleum blocks, wood, leather, plastics, metal, and Keene cement.

Trees: Yearbook of Agriculture — 1949

Edited by Alfred Stefferud. Cloth, 944 pp., 6 by 9¼ in., illus. U. S. Government Printing Office, Washington, D. C.

This very interesting book on the trees of our country ought to be on the bookshelf of every teacher of woodworking.

It tells its story in a fascinating way. The book is well illustrated and some of the illustrations are in color.

The subject matter is discussed under such general titles as: Trees and Men; Every Tree for Its Use; Trees Living Together; What Do We Plant; The Small Woodland; Christmas Trees; Company Forests; The National Forests; Projects of Many Uses; Insects, Diseases, Parasites; Fire, Friend and Enemy; Fun in the Forests; Forests and Wildlife; Wood in Use; The Forester's Calling; Yesterday and Today; and Today and Tomorrow.

TV Picture Projection and Enlargement

By Allan Lytel. Cloth, 192 pp., 5⅝ by 8¼ in., illus., $3.50. John F. Ryder, Publisher, New York City.

A book for those who service TV equipment. As can be seen by the table of contents, the basic conceptions of optics are well covered. The Schmidt projection system, and the dark-trace systems also are discussed. While the subject is quite technical the author succeeds to present it in an easily understood way.

Its six chapters present the subject matter under: Properties of Light; Reflection and Mirrors; Refraction and Lenses; The Television Picture; Commercial Applications of the Modified Schmidt Projection System; Commercial Receivers Using Refractive Projection; and Television and Motion Pictures.

Strength of Materials

By Gerner A. Olson. Cloth, 442 pp., 6¼ by 9¼ in., illus., $4.25. Prentice-Hall, Inc., New York City.

This is a text for technical institutes, college extension courses, trade schools, and college courses where students are not required to take calculus.

Many of the problems are solved graphically rather than by mathematical methods.

There are 13 chapters in which are discussed the principles of mechanics used in strength of materials, center of gravity and moments of inertia, stress and strain relationships, stresses in cylinders and spheres, riveted and welded joints, torsion, shear and bending moments, design of beams, deflection of beams, indeterminate beams, eccentrically applied loads, columns, combined stresses, and fatigue strength.

Proceedings of the Summer School for Drawing Teachers

Edited by R. P. Hoelscher and Justus Rising. Cloth, 639 pp., 6⅛ by 9¼ in., illus., $7.50. McGraw-Hill Book Co., Inc., New York City.

This summer school was inaugurated to bring into closer relationships the things taught in the engineering drawing classes in the colleges and the use to which this type of drawing is put in industry.

The report presents the discussions that took place on the background of engineering drawing, what industry requires of engineering students, what should the course content methods be to be used for teaching, examining and testing, organizing and equipping the drawing department, audio-visual aids used for teaching, and advanced courses.

Reports by the various committees also are a part of this presentation.

The Epic of American Industry

By James Blaine Walker. Cloth, 513 pp., 6¼ by 9⅛ in., illus., $5. Harper and Brothers, New York City.

A very readable historical review of America's business and industry from the time our country was first settled, through the colonial days to the time that our country gained its freedom from England.

After our money was partly stabilized, business and banking started to flourish. Slowly the mining and metal industries, as well as the textile industries, began to grow. The Erie Canal was built, the steamboat was invented, and railroads were started, the sewing machine and the reaper made their appearance, methods of steel making were perfected, the tracks of the Union Pacific were laid, and the telephone and telegraph ushered in the electric age and the flood of our modern inventions. All of this is most interestingly presented in this book which may well have a place in our industrial arts and vocational education libraries.

Driving a car is more than twice as dangerous in rural areas as in city areas, according to the 1949 edition of the National Safety Council's statistical yearbook, "Accident Facts."

Of the 32,000 motor vehicle deaths in 1948, 21,500 occurred in rural areas and 10,500 in urban areas. The mileage death rate was 10.8 deaths per 100,000,000 vehicle miles in rural areas, and only 5.3 in urban areas.

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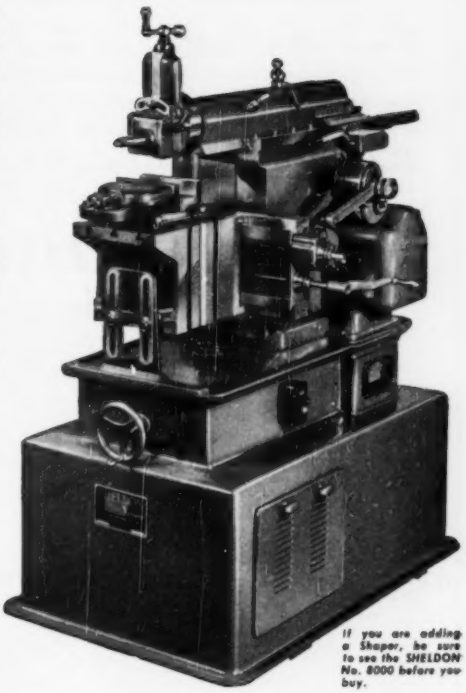

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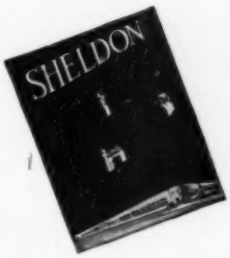

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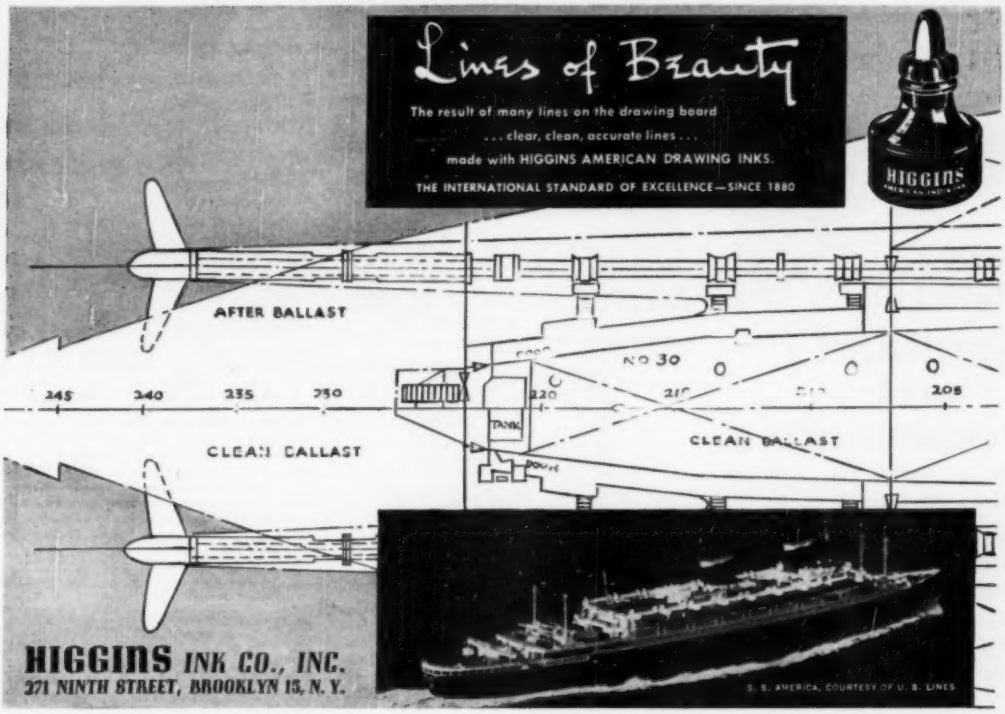


Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

NEW CENTERLESS SHAFT SUPPORT CHUCK AND SURFACE PLATE

To fill a long-felt need, a simple and practical device for use in supporting centerless shafts concentrically in the lathe has been announced by the South Bend Lathe Works, 183 East Madison Street, South Bend 22, Ind.

This inexpensive device, known as the Adjustable Collet Bushing Chuck, makes possible easy and accurate centering in the lathe of any shaft ¼ to 1 in. in diameter. For example, many

Centerless shaft support chuck

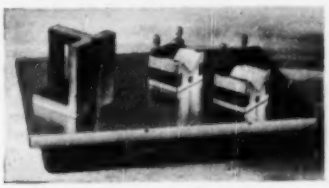
automobile starter and generator armature shafts do not have center holes and usually cannot be easily or accurately drilled for centering; however, such shafts can be quickly and accurately centered with this device.

The Adjustable Collet Bushing Chuck is manufactured with No. 2 or No. 3 Morse Taper Shanks for use in either the headstock spindle or the tailstock spindle of the lathe. Brass collet chucks can be supplied for round stock in sizes from ¼ to 1 in. by 16ths. A special size collet of .637 round capacity is available for chucking popular types of automobile generator armatures having shafts of this size.

The Adjustable Collet Bushing Chuck, when used in the lathe headstock, may be adjusted to drive the work or, when used in the lathe tailstock, may be adjusted for an accurate running fit. Further information may be obtained by writing to the manufacturer.

Another new item announced by this firm is a heavy cast-iron surface plate for laying out work, checking flat surfaces, and general toolroom and shop use. This plate is made of special quality close-grained iron having a high resistance to wear, and is heat-treated to prevent distortion. The surface is precision ground and all edges are accurately machined. The bottom is heavily ribbed and has three-point support. The size is 12 by 17 by 3 in., with top ¾ in. thick.

Toolmaker's V blocks are also available for use with the surface plate. These V blocks are made of hardened steel with all surfaces precision ground. They are supplied in matched pairs only. Each block has a clamp with knurled clamp screws which are cross-drilled for tightening with a rod. Each block is $2^{15}/_{16}$ in. wide, $1^{15}/_{16}$ in. high, and 2¼ in. long. Capacity for round work is ¼ to 2 in. in diameter.



Surface plate

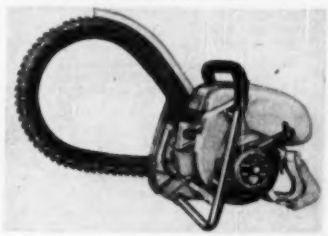
For use with this surface plate is the angle plate. This angle plate is precision ground on 6 sides. It serves as a square for laying out and setting up work and is ideal for checking and finishing right-angle surfaces. Size 3¼ by 3¼ by 4¼ in., with 5/8-in. V groove.

For brief reference use IAVE—1C01.

THE DISSTON ONE-MAN BOW SAW

Newest member of the Disston Chain Saw family is the Disston one-man bow saw. This saw is rugged, versatile, and light in weight. It is powered with a 3½ h.p. two-cycle Mercury gasoline engine.

(Continued on next page)



Disston one-man bow saw

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SHOP EQUIPMENT NEWS

(Continued from previous page)

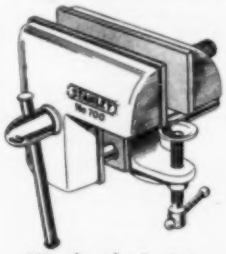
Felling and limbing under difficult conditions are made easy by use of this powerful new cutting unit. Its capacity is 15 in., and it works at top efficiency in any position. Flat guide rails are interchangeable with the bow saw.

For further information write to Henry Disston & Sons, Inc., 538 Tacony, Philadelphia 35, Pa.

For brief reference use IAVE—1002.

NEW WOODWORKER'S VISE AND PULL-PUSH RULES

Stanley Tools, New Britain, Conn., announces the development of a new style woodworker's vise. Constructed of cast iron, this vise is finished in gray enamel with red trim. The steel screw parts are nickel plated to prevent rust.

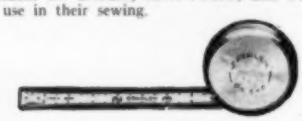


Woodworker's vise

The L-shaped jaws are designed to hold work firmly, horizontally as well as vertically. Jaw faces are covered with tempered preswood and can be replaced when worn out. Slack-free jaw and screw control insure rigidity and easy operation.

The Stanley No. 700 woodworker's vise can be held in many varied positions to accomplish many types of jobs. It can be attached any place where there is a projection large enough to fasten the vise.

This firm also has announced new style Nos. 546 and 548 "Pull-Push" Rules. These rules are excellent for artisans, home-owners, and women to use in their sewing.



New pull-push rule

The Nos. 546 and 548 rules are supplied in a watch-size case, nickel plated with a brushed satin finish. Vertical markings on blade make rules easier to read in any position. Attached blades are nickel plated, ½ in. wide, graduated in 16ths both edges, in 32nds on upper edge for first 12 in. The 546 has a 6-ft. blade and the 548 has an 8-ft. blade.

For brief reference use IAVE—1003.

SCHOOL-SHOP PLANNING

J. D. Wallace & Co., 134 S. California Ave., Chicago 12, Ill., have inaugurated a shop planning service which deserves much credit. The illustration shown herewith, shows a layout made recently for a school customer that had a rather limited space in which to accommodate 24 students and the necessary benches and woodworking equipment. The location of supporting posts in this instance made further complications in working out a suitable arrangement.

With the fine layout went recommendations for the purchase of the Wallace No. 11 Universal Saw, No. 10 jointer, No. 16 band saw, No. 46 lathe, No. 23 oilstone grinder, and No. 1 radial

(Continued on next page)

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Sterling all-steel, all-welded foundry flasks combine maximum strength with minimum weight. Solid center rib and solid sand flanges at top and bottom. Full-width bearing. In style "S" flask, pin lugs and handles are combined. When closing flask, molder can guide cope over pins by feeling pins with his fingers. In many foundries, style "S" flask has replaced snap flasks. Prevents run-outs. Requires less sand.

Write for new Catalog No. 39, describing the complete line of Sterling Foundry Equipment.

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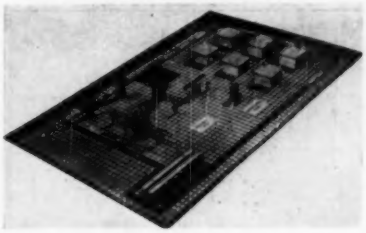
SHOP EQUIPMENT NEWS

(Continued from previous page)



Shop planning aid

saw. The use of four-position workbenches helped to conserve space in the bench area, and also leave some room for assembly of larger projects.

In submitting such layouts to school instructors, supervisors, superintendents, board members, etc., it is our purpose to design a layout that will provide a course of highest educational standards, maximum safety for the students, and the greatest economy in connection with the school budget.

There is no cost or obligation for our planning service, when used by authorized instructors, supervisors, directors, architects, and other educational officials.

For brief reference use IAVE—1004.

NEW BLACK & DECKER 6-IN. HOME-UTILITY SAW

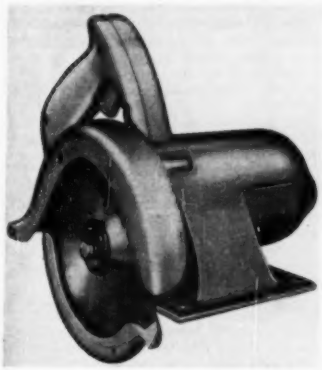
Another tool added to the constantly expanding line of portable electric tools manufactured by The Black & Decker Mfg. Co., Towson 4, Md., is the Home-Utility 6-in. Saw.

This saw is designed for a variety of essential uses in general carpentry, home construction or alteration, and building and maintenance jobs encountered on the farm. It will cut to size wood, slate, tile, marble, or ceramics. The 6-in. saw has a full-powered motor made by Black & Decker which gives more than adequate power for a normal 2-in. depth of cut when cross-cutting or ripping. The motor is universal for use on 110-volt a.c. or d.c. current and delivers a no-load spindle speed of 5500 r.p.m.

The 6-in. saw is equipped with a 2-pole trigger switch that turns the saw *off* instantly when the trigger is released. Another safety feature is the telescoping lower blade guard. Full-sized ball bearings are used throughout except for a needle bearing at the end of the blade spindle.

Standard equipment includes a 6-in. combination blade. A crosscut or planer blade and abrasive disk are available as extra equipment. A 10-ft. 3-wire rubber covered cable with plug is supplied with the tool.

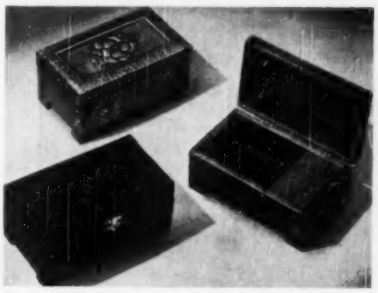
For brief reference use IAVE—1005.



Home-utility 6-in. saw

MUSIC-BOX KITS

American Handicrafts Co. Inc., 45-49 So. Harrison St., East Orange, N. J., announces a novelty which will interest students as well as instructors.



Music boxes

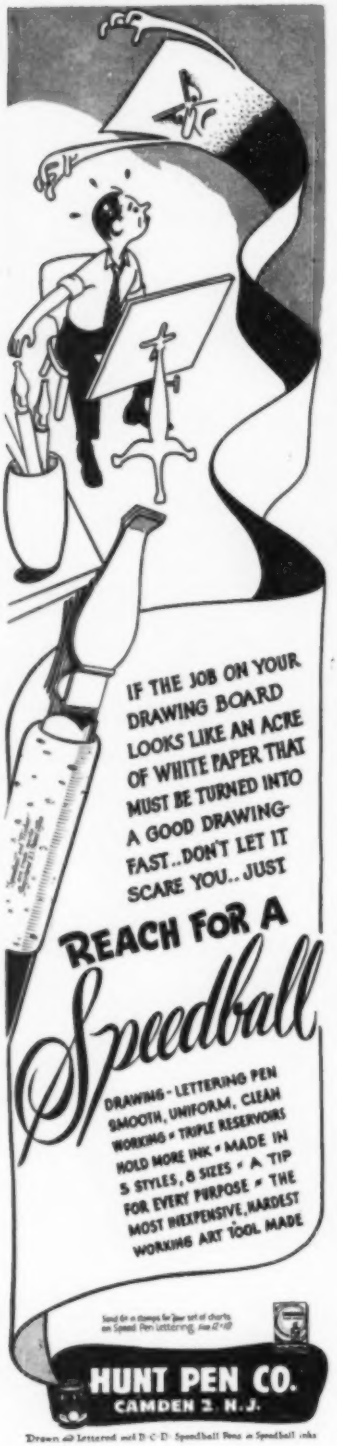
This novelty consists of a music-box kit which comes complete with an imported Swiss musical movement and your choice of tunes.

The boxes may be decorated with paints, enamels, tooled copper, or leather.

For more detailed information write to the American Handicrafts Co. Inc.

For brief reference use IAVE—1006.

(Continued on next page)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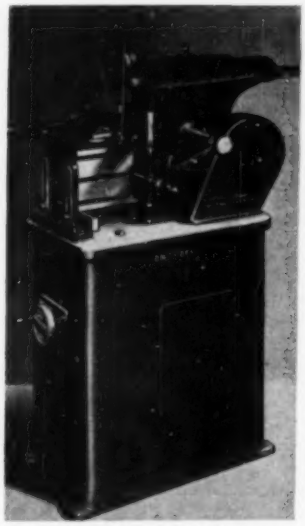
SHOP EQUIPMENT NEWS

(Continued from previous page)

NEW LOGAN ENGINEERING 8-IN. SHAPER

Logan Engineering Co., 4901 West Lawrence Ave., Chicago 30, Ill., announces production of a new 8-in. shaper of advanced design. It has an 8½-in. maximum stroke, thus permitting a full and accurate machining of work 8 in. long. Straight cuts, angular cuts, squaring, machining, and slotting can all be done quickly and accurately.

The new shaper has six automatic feeds in either direction, from .002 to .012 in. They are set by a feed dial with readings graduated to .001 in. A half turn of the feed handle in either direction reverses the feed. Speeds from 35 to 180



New Logan 8-in. shaper

strokes per minute may be obtained by simply turning a convenient hand wheel control. The 8 by 8-in. table has a vertical travel of 5½ in., and a 10½-in. traverse. The tool head may be swiveled 360 deg., and squaring the ends of stock of almost any length is possible.

For brief reference use IAVE—1007.

THE POWER TOOL DIVISION OF THE ROCKWELL MANUFACTURING COMPANY

Rockwell Mfg. Co., Pittsburgh, Pa., has announced the formation on July 1 of the Power Tool Division of the company.

This new division has headquarters in Milwaukee and serves as the selling organization for the four divisions of Rockwell engaged in the manufacture of various types of power tools.

Heading the new organization is Robert P. Melius, for many years sales manager of Delta Manufacturing Division in Milwaukee. Delta is one of the divisions whose output is to be marketed through the new Power Tool Division of Rockwell. Delta products include Delta-Milwaukee Machine Tools and Delta-Milwaukee Power Tools, for many metalworking and woodworking applications.

Other Rockwell plants whose products are to be sold by the new division are: Arcade Manufacturing Division, Freeport, Ill., maker of Delta-Homecraft Power Tools for the home workshop market; Red Star Products Company, Norwalk, Ohio, maker of Delta-Multiplex Radial-Arm Saws, widely used in construction work; and Crescent

(Continued on page 42A)

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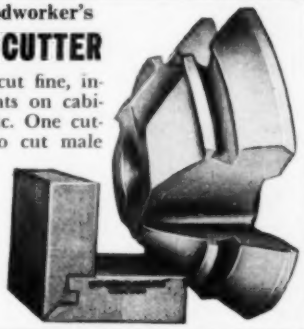

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FOR SCHOOL SHOPS

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SHOP EQUIPMENT NEWS

(Continued from page 40A)

Machine Division, Leetonia, Ohio, manufacturer of Crescent Woodworking Machinery, found in many furniture factories and other woodworking plants.

For brief reference use IAVE—1008.

FRANKLIN LIQUID HIDE GLUE

Rudy Bierberg, age 16, and Dick Elflein, age 17, students at the Boys Trade School, Columbus, Ohio, are constructing a workbench, all from scrap material. Rudy is putting the finishing touches on one section of the top, while Dick selects some scrap wood for another section.

Franklin liquid hide glue was used exclusively on this project. This thin-lined liquid hide glue, a product of The Franklin Glue Co., Columbus 15, Ohio, is fine for classroom use since it can be used right from the original container, and is always ready when classes start as no mixing or heating is required. This hide glue makes strong joints, and does not stain wood. Franklin liquid hide glue is available in handy tubes, and in one-fourth pint, half-pint, pint, gallon, and five-gallon containers.

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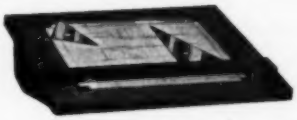

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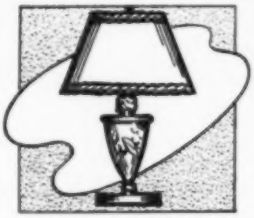

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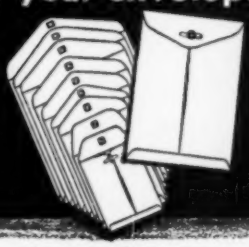

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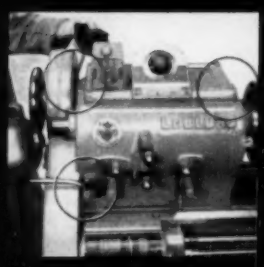

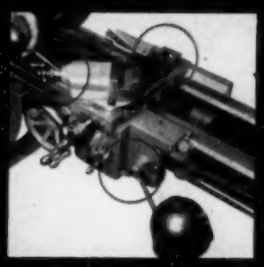

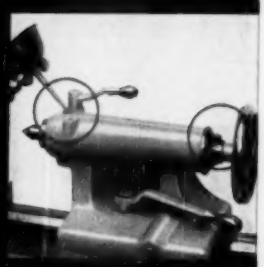

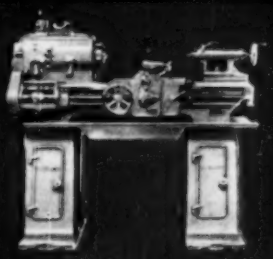

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